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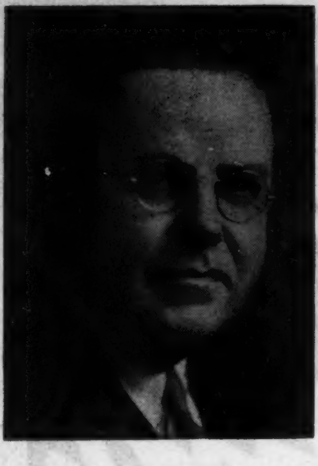
American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

March 1944



Usefulness Is Principal Object in Compiling Data For the Cupola Handbook

FOR the benefit of those who are not closely associated with the development of the Cupola Research Project, it is probably wise to restate the purpose of the Handbook on Cupola Operation. This book, in the course of publication, is the first tangible accomplishment of the committees in charge of the Project.

The Handbook is intended to be factual, to contain operating records, tabular data and other recorded facts which are expected in any handbook. The text is sufficient only to support handbook data and is a compilation of the ideas of those best qualified to express an opinion on a particular subject.

Since the Handbook is a committee job, it is not, and should not be, the work of one man or group of men. Those charged with the final decisions regarding the content of the Handbook have reached the point where they must choose between the opinions of many people, effect compromises and proceed with the editing of the manuscripts so that the resulting Handbook will be of greatest usefulness.

Within a short time, mimeographed copies of various sections will be mailed to committee members and individuals having special knowledge on specific subjects. A prompt perusal and sincere criticism will be most helpful.

The Cupola Research Committee will gladly consider suggestions of anyone, whether his name is officially listed as a committee member or not.

R. G. McElwee,
Chairman, Cupola Research Project.

R. G. McELWEE, Chairman of the A.F.A. Cupola Research Project, is also serving on several other gray iron committees and as Vice-Chairman of the Detroit Chapter. Born in Williamsport, Pa., Mr. McElwee has been connected with the foundry industry since 1915. He is known as one of the most progressive gray iron foundrymen in the country, and has contributed much to the development of cupola operation through his untiring work on committees and by his technical writing. At present he is associated with the Vanadium Corp. of America, Detroit.

American Foundryman

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A.F.A. Subcommittee on Sintering Test Reports

The report of the Subcommittee on Sintering Test of the A.F.A. Foundry Sand Research Committee deals this year with the behavior of sand on molten iron, whereas last year's report was principally concerned with the reactions on molten steel. Members of A.F.A. are requested to submit samples of adhering sand to aid in further experimental work.

THE work of the subcommittee during the past year has been a continuation of previous work, being primarily a study of the behavior of sand when in contact with molten iron. This work has not been as extensive as the study of sands in contact with molten steel, reported by one of the members of the committee last year, having consisted of microscopic examination of specimens of "burnt on" or adhering sand, collected from a few iron foundries.

All samples examined so far show the same mechanism of adherence that was found with steel sands, namely, penetration of the iron into the sand. Again this penetration was found to be mechanical, caused by too large voids present in the sand as rammed, due to fusion and the opening of large voids because of this fusion, or due to veining caused by dimensional instability.

The fact that all samples of adhering sand in iron practice, shown in this report, are due to penetration does not preclude the possibility of adhering sand due solely to fusion at the sand metal interface and no penetration.

A number of iron foundrymen claim that the latter mechanism has been observed in iron practice, but as yet have not submitted specimens. As the proof that it is necessary to have penetration in order for the sand to adhere to the surface of the casting is negative, it will be necessary to examine many more samples of adhering sand in iron practice before we can say that adherence without penetration is, or is not, possible.

Definitions of Sintering Discussed

The committee would like to call to the attention of the industry the exact definitions of the two sintering points now in use. Definitions may seem academic, but in this particular case they are very important, for they explain just what is occurring during the test. Indications are that almost the same action occurs when molten metal comes in contact with a molding material.

The definition of the "A" sintering point follows:

> The "A" sintering point is the lowest temperature at which the surface of the sand specimen in contact with the platinum ribbon has sintered enough to adhere to the ribbon with sufficient force to bend it when it is lifted.

That for the "B" point:

> The "B" sintering point is the lowest temperature at which the smaller grains can be seen to start to fuse at low magnifications, 20 to 25 diameters. This is the point of incipient fusion.

These definitions emphasize one very important point—the sintering or fusion at the "A" and "B" sintering points is microscopic. This is where the sintering points differ the most from the classic tests for fusion, such as the pyrometric cone equivalent test.

The reason that the sintering test can be correlated with the behavior of the sand in contact with molten metal is due to this fact; fusion in microscopic dimensions can cause adhering sand. Penetration of the sand by the metal of just a few thousandths of an inch can cause serious "burn on" or adherence. Extreme cases of "burn on" or adherence will occur before an appreciable portion of the sand mass as a whole is affected.

A Different Viewpoint

An important correlative of this viewpoint is that a number of variables will affect the sintering points and the behavior of the sand in contact with molten metal, having no effect on the classical tests such as fusion tests and pyrometric cone tests. Both of these latter tests determine the fusion of softening of the mass as a whole, and under conditions that approach equilibrium and infinite time.

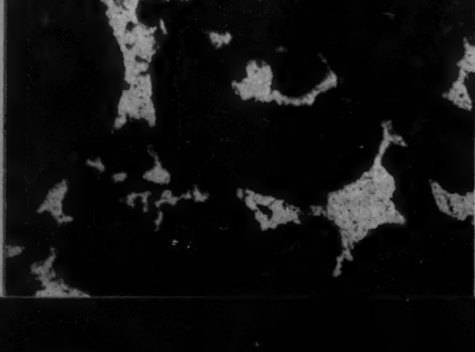
The sintering test, on the other hand, is conducted, not under equilibrium conditions but under controlled disequilibrium conditions. This is important, as conditions in the foundry are such that equilibrium is never attained when metal comes in contact with molding sand containing silica or silicates, except in case of very massive castings.

The foundryman, accustomed to thinking of metals with sharp melting points, must change his viewpoint when thinking of silica or high silica silicates. These materials do not melt, as do metals, into liquid phases with viscosities approaching that of water.

On the contrary, liquid silica and high silica silicates, just above the liquidus line, are almost as viscous as when they are solid, and they

Fig. 1. Iron Penetration Due to Fusion. 25X. Vertical Illumination.

Fig. 2. Mechanical Penetration of Iron. 25X. Vertical Illumination.



must be superheated several hundred degrees before they become fluid in the sense that a metal is fluid.

This is doubly important when dealing with a material of non-uniform particle size, such as molding sand. Silica differs from a metal in another respect in that melting occurs only at the outside surfaces of the particle, whereas melting can occur within a particle or crystal of metal.

This means that, with increasing temperature, the smaller particles of a molding sand will melt and become fairly fluid long before the larger particles are affected by the heat. This is exactly what happens in practice when a sand starts to fuse. It is possible to have, what is for all practical purposes, complete breakdown of the sand and still have the larger grains of the sand unaltered by the heat.

Silica is just as sluggish chemically as it is physically. Therefore, impurities have a much greater effect on the sintering points and behavior of the sand in the foundry, when they are present in the A.F.A. silica phase, than when they are present as a separate phase in the A.F.A. clay fraction.

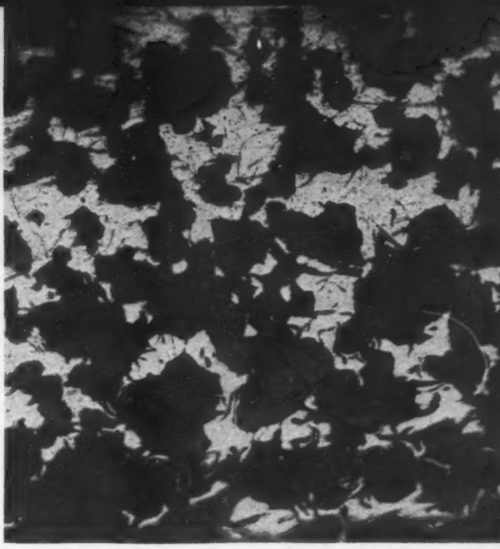
Effect of Time

Both of these variables, particle size and distribution of impurities have no appreciable effect under equilibrium conditions such as present in the pyrometric cone test. The big difference here is time or, to put it more exactly, disequilibrium.

Any other variable, when dealing with silica, in which time is a factor will also affect the sintering test and the behavior of the sand in contact with liquid metal, and will have little or no affect on the classical methods of determining the melting or softening points of silica.

The committee would also like to discourage the use of the terms "burnt on sand" and "burn on" to describe the condition of sand adhering to the outer surfaces of a casting, and substitute the terms adhering sand and adherence, since they would be more appropriate.

Terms using the word "burn" imply a heat effect, fusion, or at least sintering. In reality, heat, fusion or sintering is only one of a number of causes of adhering sand, some of which are simply mechanical and can occur with no heat other than that required to heat the sand to above the melting point of the metal.



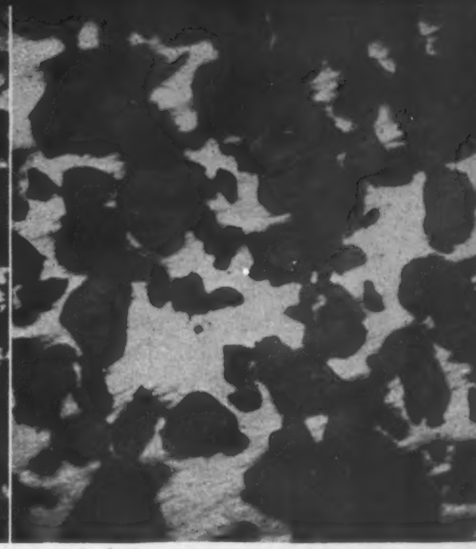


Fig. 3. Penetration of Iron into Sand, Due Probably to Soft Ramming. 25X. Vertical Illumination
Fig. 4 Penetration of Steel into Sand, Proved to Be Due to Soft Ramming. 25X. Vertical Illumination.

Mechanism of Adhering Sand In Iron Practice

Figs. 1 and 2 show two examples of adhering sand from one iron foundry, and they are interesting because they show two mechanisms of adherence. Both samples were from the same castings, the only difference being that the two castings were poured in different sands.

Fig. 1 shows the sand metal interface when a low sintering point sand was used ("B" point 2250° F.); the sand also contained calcium and magnesium carbonates. The smaller particles of this sand have fused completely, the silica grains have not been affected by the temperature of molten iron. Adherence in this case was serious, with the sand permeated by the molten iron.

Fig. 2 shows the sand metal interface of the same casting poured in a high sintering point sand ("B" point 2700° F.). This is interesting because it shows what trouble can be expected if one simply increases the sintering point of the sand without taking into consideration the other causes of penetration.

The amount of adhering sand in this case is almost as great as when the very low sintering point sand was used, the only difference being that this sand could be removed fairly easily from the surface of the castings while that shown in Fig. 1 was almost impossible to remove. The adhering sand shown in Fig. 2 is due to mechanical penetration and may be due to the sand actually being too refractory. This is a good example of why "burn on" is such a poor descriptive term.

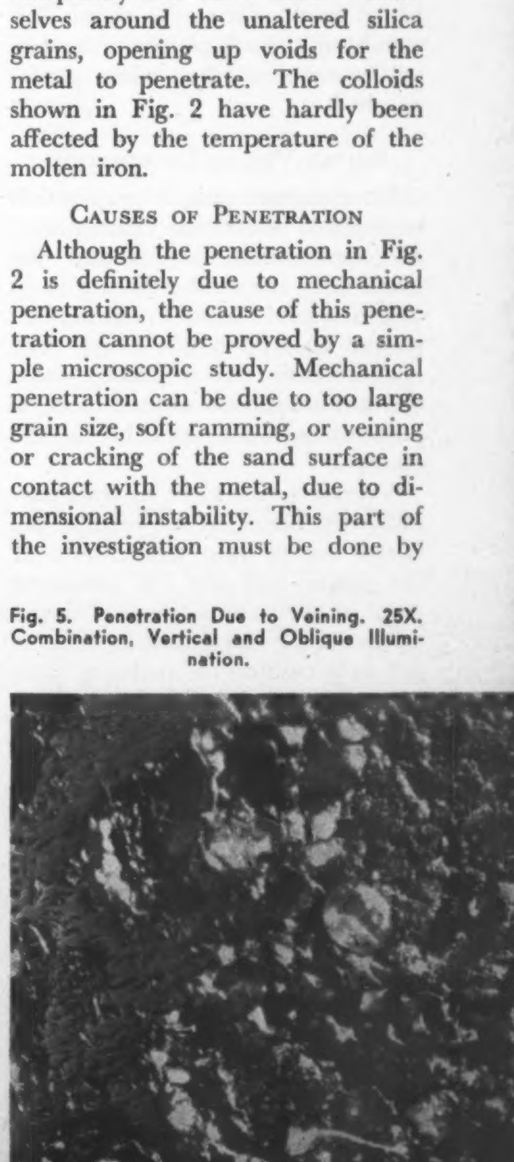
That the adhering sand, shown in Fig. 2, is due to mechanical penetration can be seen by comparing the condition of the colloids in Figs. 1 and 2.

In Fig. 1 the colloids have fused completely and have drawn themselves around the unaltered silica grains, opening up voids for the metal to penetrate. The colloids shown in Fig. 2 have hardly been affected by the temperature of the molten iron.

Causes of Penetration

Although the penetration in Fig. 2 is definitely due to mechanical penetration, the cause of this penetration cannot be proved by a simple microscopic study. Mechanical penetration can be due to too large grain size, soft ramming, or veining or cracking of the sand surface in contact with the metal, due to dimensional instability. This part of the investigation must be done by

Fig. 5. Penetration Due to Veining. 25X. Combination, Vertical and Oblique Illumination.



someone in the plant itself and cannot be done at another laboratory located miles away.

Fig. 3 shows another example of sand adhering to an iron casting. The very large voids between the silica grains are completely filled with iron. Penetration in this case probably is due to soft ramming. At least it would be true for steel.

If the graphite flakes in Fig. 3 are neglected, the penetration in this sample is indistinguishable from that in Fig. 4, penetration into a steel sand that was proved to be due to soft ramming.

Fig. 5 shows a case of adhering sand on an iron casting, due to veining or dimensional instability. A number of foundrymen have confused this type of penetration with uniform penetration. It is important to distinguish these two types of penetration, as the mode of attack for their elimination is entirely different.

Note in this photomicrograph (Fig. 5) the continuous vein of iron at the left with a dense unpenetrated sand mass to the right. This condition is much plainer under visual examination than when photographed.

Simple Visual Examination

No elaborate sample preparation is required for visual examination. All that is necessary is that the metal with the sand adhering to it, or the sand metal mixture, be ground on a fairly fine wheel. The metal stands out brilliantly from the dark sand mass and the mode of penetration is unmistakable to the observer.

Veining seems to be at least partially dependent on the relation between the pouring temperature of the metal and the "B" sintering point of the sand. A trace of fusion at the sand metal interface seems to act as a cushion or, perhaps, more like a glue and holds the sand together until the metal forms a solidified skin.

This is borne out in steel practice by the use of iron oxide, a compound that lowers the "B" sintering point slightly as well as increases the hot strength. It may be that in iron and non-ferrous practice a stronger flux would be beneficial. It is significant that veining is more prevalent on iron and non-ferrous castings than on steel castings, with their much higher temperatures at the sand metal interface.

Samples Requested

This report is submitted by the committee primarily to promote thought and discussion. It should be emphasized that a number of theories, especially regarding the mechanism of veining, require experimental confirmation. The committee is very anxious to receive samples of adhering sand, especially those that seem to be due to fusion without penetration, and samples of veining. The samples need not be large, one-half sq. in. of surface is sufficient. They can be sent to any member of the committee, or to the national office of the American Foundrymen's Association.

Members of the Subcommittee on Sintering Test include the following members: Chairman, J. B. Caine, Sawbrook Steel Castings Co., Lockland, Cincinnati, Ohio; K. J. Jacobson, Griffin Wheel Co., Chicago; W. C. Cress, Armour Research Foundation, Chicago; H. W. Dietert, Harry W. Dietert Co., Detroit; L. B. Osborn, Hougland & Hardy, Inc., Evansville, Ind.; H. F. Taylor, Naval Research Laboratory, Washington, D. C.; R. O. Wertz, Fullerton Union High School, Fullerton, California.

A Self-Check for the Plant Foreman

GLENN GARDINER has written a little booklet entitled, "Qualities of a Good Boss," which is designed as a practical self-rating check-up for persons in supervisory positions.

The following phases of supervision are considered: Knowledge of the Job, Friendliness, Loyalty, Fairness, Appreciation, Instructing Ability, Interest in Safety, Consideration of Others, Leadership or Drivership, Control of Temper, Foresight, Consistence, Open Mindedness, Keeping Promises, Use of Authority. At the end of the booklet is a "score sheet" whereby the foreman can get an over-all picture of himself and determine his supervisory ability rating.

The 24-page booklet is published by the Elliott Service Co., 219 East 44th St., New York, which is devoting its entire resources to publishing educational helps for foremen, industrial bulletin board displays on work improvement, waste and accident prevention, and employee suggestion services to aid industry and industrial supervisors improve their war effort.

Book Review

Plastics, by J. H. DuBois. Cloth bound, 435 pages, 203 illustrations, 50 tables. Revised edition. Published by American Technical Society, Chicago. Price, $3.75.

This discussion of the manufacture, properties, and uses of important plastics materials and products was written for users of plastic materials who need basic design information, but not for the chemist. It would also prove of value to the uninformed reader who wishes to learn something of the extent and nature of the plastics industry.

The content is comprised of phenolic plastics; urea or amino plastics; cellulose plastics; acrylic, vinyl and styrene plastics; cast phenolic and protein plastics; other plastic materials; cold molded plastics and shellac; laminated plastics; compression and transfer molding; injection molding and continuous extrusion; finishing and decorating plastic products; design of molded products; synthetic rubber; low pressure laminating; trends and developments; and general properties and uses for molded plastic materials.

Committee Seeks Data On Plaster Molding

THE Plaster Molding Committee of the Aluminum and Magnesium Division, in developing information for discussion of committee reports and papers, is anxious to know of all companies that are using plaster for molding purposes, or through the lost wax process.

"American Foundryman" readers are requested to please forward the names of such concerns to the Plaster Molding Committee, Aluminum and Magnesium Division, American Foundrymen's Association, 222 W. Adams St., Chicago.

The cooperation of A. F. A. members in this matter will be greatly appreciated.

Wartime Production to Predominate Congress

TIMELY and practical information that foundrymen can put to immediate use in production of cast metals for war purposes features the technical program to be presented at the 3d War Production Foundry Congress, to be held at Buffalo, April 25-28. The high caliber of papers to be presented, plus exhibits of materials and equipment for foundry use, are expected to be big drawing cards for this 48th Annual Convention of the American Foundrymen's Association.

Broad Scope of Exhibits

A surprising number of exhibitors will display their products and services of foundry usefulness this year, including not only most of those firms who exhibit regularly at Foundry Shows but also a large number of new faces. It has been announced by A.F.A. officials that the number of exhibitors at the Buffalo Foundry Congress will be the greatest for any previous convention since the big event held in 1930 at Cleveland.

Exhibiting companies are expected to concentrate their efforts on the displaying of their improved and new products of maximum value to the wartime production of castings. A number are planning, as in 1942, to offer their services as "conference clinics," although the majority will display actual equipment and materials, with operation of such equipment limited only to demonstrations of working parts and the like.

Buffalo Preview

Although the Congress and Show proper are scheduled to open Tuesday morning, April 25, all exhibits will be opened for a "Buffalo Preview" from 6:00 to 10:00 p.m. the night of Monday, April 24. These previews, which proved so popular in 1938, 1940 and 1942, give local plant men an opportunity to inspect the latest advancements in equipment and materials, especially men who are unable to attend during the following four days. In many cases, men attending the preview report back to their operating supervisors on particular exhibits they consider of greatest application to their own work.

Admission to the preview night will be entirely free, on presentation of invitation cards distributed by the national office of A.F.A. in Chicago and through members of the Western New York and Rochester Chapters of A.F.A. Attendance at the preview held in Cleveland two years ago ran into the thousands, and the outlook for this year's advance event is considered equally bright.

Light Metals Program

Papers scheduled by the Association's Aluminum and Magnesium division for the Buffalo Congress cover a broad field of processes. Subjects to be covered include the effect of alloying elements; the cold-chamber die casting process; controlled directional solidification in plaster molds; determination of permeability of plaster molds, and micro-radiography as a foundry tool. In addition, the annual exchange paper from the Institute of British Foundrymen, prepared by John Vickers, Rolls-Royce Ltd., England, will deal with permanent mold castings.

Malleable Papers Stress Gating and Risering

One of the features of the Malleable Iron program will be papers on melting practices and control. The "main event" in consideration of this metal will be a symposium of nine papers dealing with heading and gating procedures and technique, continuing the successful policy of presenting malleable symposia offered at the last several conventions.

Some of the papers included in this program will deal with pulverized coal firing of malleable annealing and melting furnaces; malleable mixture calculations and melting control; heat flow problems; coin pressing malleable castings, and physical properties developed by isothermal quenching of malleable iron.

Extensive Steel Program

A large number of papers will be offered steel foundrymen attending the Congress, divided into four general types: Papers on steel and problems, on hardenability and heat treatment, on physical properties of steel castings, and on non-destructive testing methods. Of the papers on steel foundry sands, one will deal with the use of cumulative curves in foundry sand control, and another will discuss high-temperature properties of steel sands. On the latter subject, several contributions will be offered.

Three papers are scheduled on hardenability problems, and an additional paper on problems in heat treating castings made from air-hardenable steel. On the subject of physical properties, one author will deal with properties of low-alloy low-copper copper-bearing steels; another, with recent steel castings developments; a third, with test bar molds for steel castings. Several

Peace Bridge over which Canadian visitors will travel to Buffalo to attend the 3rd War Production Foundry Congress.

Civic Center in the heart of Buffalo, showing Statler Hotel where many technical sessions will be held.

papers also will be presented on non-destructive testing methods, including important committee reports.

Brass and Bronze Problems

The A.F.A. Brass and Bronze division is sponsoring several interesting presentations this year, including a paper on non-ferrous melting in the cupola. Other papers dealing with melting problems and procedures include a paper on melting red brass and tin bronzes in open-flame and crucible furnaces, and still another author choosing as his subject the effect of temperature, water vapor and carbon reaction in various types of brass melting furnaces.

Gray Iron Subjects

Molding, melting and processing procedures are among the important gray iron aspects due for consideration at Buffalo, in the program prepared by the Gray Iron division men. Subjects to be covered in papers include ladle treatment of cast iron; factors in superheating and its effects; some phases of cupola operation and properties of gray cast iron; a study of molding methods to produce sound castings; molding steam cylinders for marine engines, and method of preparing cast iron for subsequent processing. A Gray Iron Shop course also is being planned to cover welding, chill tests and foundry coke.

Pattern Making Papers

Several papers of unusually timely interest will be presented by the Program and Papers Committee of the Patternmaking division this year, such as the use of plaster for foundry patterns, a subject that has received more attention recently. Of still greater importance to the industry will be the discussions on securing cooperation between the foundryman and patternmaker.

Papers on Centrifugal Casting

The increasing attention given lately to centrifugal casting of metals is evidenced this year by presentation of a symposium of seven papers, dealing not only with problems and methods of production but also the engineering principles involved in various phases of construction of centrifugal casting machines. Of particular interest, perhaps, will be a paper on the new "investment molding" process.

General Interest Papers

The 1944 program, as now planned, will offer a considerable number of general interest papers, covering a broad range of subjects. On the subject of plant and plant equipment, papers will be presented on small foundry conveyorization. and maintenance in relation to foundry equipment. Manpower and training problems will, as usual, call forth good attendance to hear discussions of foreman training, women as foremen, training foremen to handle women employees, the conference room method of training, and development of foremen for the post-war period.

In addition to papers covering inspection problems methods, the committee is sponsoring a session on analytical methods for cast metals. Two papers on that phase of inspection will deal with spectrographic analysis, and one on the combination method of analysis for iron and steel. The committee charged with this phase of the program is evolving an excellent group of subjects.

The recently formed Inspection Committee of A.F.A. will sponsor its own program of two sessions for the first time this year and a large turnout is expected on this all-important subject.

In the field of refractories, papers will be considered on drying of foundry ladles and high-temperature heat insulation. The Committee on Cooperation with Engineering Schools is expected to attract attention with a discussion of the employment of technical school graduates.

Of interest to many personnel men will be the discussions sponsored by the Committe on Job Evaluation and Time Study. One important phase of this work to be discussed will be the application of time studies in wartime. Another will be a discussion of government rules and regulations on incentive work, presented by a member of the War Production Board. Special war production sessions also will be sponsored on the vital question of manpower problems, with outstanding speakers offering helpful information for plant executives.

Informal Sessions

Needless to say, there will be a number of round-table and similar "off-the-record" sessions offered this year, sponsored by the various divisions of the Association. The always-popular shop operation courses again will be held, and the attendance of shop men is expected to be unusually large. These later sessions are being scheduled in the evening to accommodate local attendance.

Hotel Reservations

Requests for Hotel Rooms during the Buffalo Foundry Congress now are being considered by the A.F.A. Housing Bureau in Buffalo, and definite assignments soon will be made for all who have sent in applications. Because of hotel conditions prevailing everywhere today, the Association has requested those planning to attend to plan on joint reservations wherever possible, so

that all rooms at Buffalo will be fully utilized.

The Association has announced for this convention a plan for taking care of servicemen that is perhaps unique for wartime business meetings. Believing that men in uniform who come to Buffalo during the week of the Congress, whether on furlough or on orders, are entitled to "priority" in accommodations, the Congress Housing Bureau has been instructed to withhold 10 per cent of each hotel's convention commitments. In case these rooms are not required for servicemen, they will be released on a daily basis to men attending the meeting.

PARTIAL LIST OF EXHIBITORS

1944 FOUNDRY SHOW

Adams Company	Dubuque, Iowa
Air Reduction Sales Co.	New York
Ajax Electrothermic Corp.	Trenton, N. J.
Ajax Engineering Corp.	Philadelphia
Ajax Metal Co.	Philadelphia
Ajax Flexible Coupling Co.	Westfield, N. Y.
American Air Filter Co., Inc.	Louisville, Ky.
American Allsafe Co., Inc.	Buffalo
American Crucible Co.	Shelton, Conn.
American Foundry Equipment Co.	Mishawaka, Ind.
American Optical Co.	Southbridge, Mass.
American Photocopy Equipment Co.	Chicago
American Steel Abrasive Co.	Galion, Ohio
Arcade Mfg. Co.	Freeport, Ill.
Asbury Graphite Mills, Inc.	Asbury, N. J.
Automatic Transportation Co.	Chicago
Ayers Mineral Co.	Zanesville, Ohio
Baker Perkins, Inc.	Saginaw, Mich.
C. O. Bartlett & Snow Co.	Cleveland
Beardsley & Piper Co.	Chicago
Black, Sivalls & Bryson, Inc.	Kansas City, Mo.
Blaw-Knox Co.	Pittsburgh, Pa.
Bloomsbury Graphite Co.	Bloomsbury, N. J.
Blystone Division (Standard Sand & Machine Co.)	Chicago
Bradley Washfountain Co.	Milwaukee
Buckeye Products Co.	Cincinnati
Adolph I. Buehler	Chicago
Buell Engineering Co., Inc.	New York
Buffalo Forge Co.	Buffalo
Campbell-Hausfeld Co.	Harrison, Ohio
Canadian Radium & Uranium Corp.	New York
Edwin S. Carman, Inc.	Cleveland
Certified Core Oil & Mfg. Co.	Cicero, Ill.
Chain Belt Co.	Milwaukee
Champion Foundry & Machine Co.	Chicago
Clearfield Machine Co.	Clearfield, Pa.
Cleveland Flux Co.	Cleveland
Cleveland Pneumatic Tool Co.	Cleveland
Cleveland Quarries Co.	Cleveland
Climax Molybdenum Co.	New York
L. A. Cohn & Bro., Inc.	Chicago
L. S. Cohen & Co., Inc.	Chicago
Columbus McKinnon Chain Corp.	Tonawanda, N. Y.
Combined Supply & Equipment Co., Inc.	Buffalo
Conco Eng. Works, Div. H. D. Conkey & Co.	Mendota, Ill.
Conover Engineering Co.	Cleveland
Corn Products Sales Co.	New York
Daily Metal Reporter, Atlas Publishing Co.	New York
Davenport Machine and Foundry Co.	Davenport, Iowa
Dayton Oil Co.	Dayton, Ohio
Delta Oil Products Co.	Milwaukee
De Walt Products Corp.	Lancaster, Pa.
Wm. Demmler & Bros.	Kewanee, Ill.
Despatch Oven Co.	Minneapolis
Detroit Electric Furnace Div., Kuhlman Electric Co.	Bay City, Mich.
Harry W. Dietert Co.	Detroit
Joseph Dixon Crucible Co.	Jersey City, N. J.
Dougherty Lumber Co.	Cleveland
Allen B. Du Mont Laboratories, Inc.	Passaic, N. J.
Duquesne Smelting Corp.	Pittsburgh, Pa.
Eastern Clay Products, Inc.	Eifort, Ohio
Electro Metallurgical Co.	New York
Electro Refractories & Alloys Corp.	Buffalo
Elwell-Parker Electric Co.	Cleveland
Engineering Sales Co.	Oshkosh, Wis.
Eutectic Welding Alloys, Inc.	New York
Fanner Mfg. Co.	Cleveland
Federal Foundry Supply Co.	Cleveland
Federated Metals Div., American Smelting & Refining Co.	New York
Fisher Furnace Co.	Chicago
Foundry Equipment Co.	Cleveland
Foxboro Co.	Foxboro, Mass.
Freeman Supply Co.	Toledo
Fremont Flask Co.	Fremont, Ohio
Frontier Bronze Corp.	Niagara Falls, N. Y.
Gamma Instrument Co., Inc.	New York
General Electric X-Ray Corp.	Chicago
Globe Steel Abrasive Co.	Mansfield, Ohio
Great Lakes Foundry Sand Co.	Detroit
Great Western Mfg. Co.	Leavenworth, Kan.
Samuel Greenfield Co., Inc.	Buffalo
Hanna Furnace Corp.	Detroit
Benjamin Harris & Co.	Chicago
Hercules Powder Co.	Wilmington, Del.
Herman Pneumatic Machine Co.	Pittsburgh, Pa.
Hickman, Williams & Co.	Chicago
Hill & Griffith Co.	Cincinnati
Hines Flask Co.	Cleveland
Hoffman Foundry Supply Co.	Cleveland
E. F. Houghton & Co.	Philadelphia
Hougland & Hardy, Inc.	Evansville, Ind.
Hudson Foundry & Machine Co., Inc.	Chicago
Hydro-Blast Corp.	Chicago
Illinois Clay Products Co.	Joliet, Ill.
Illinois Testing Laboratories, Inc.	Chicago
Independent Pneumatic Tool Co.	Chicago
Industrial Minerals Co.	Lancaster, Ohio
Insto-Gas Corp.	Detroit
International Graphite & Electrode Corp.	St. Marys, Pa.
International Molding Machine Co.	Chicago
International Nickel Co., Inc.	New York
Ironton Fire Brick Co.	Ironton, Ohio
Jackson & Church Co.	Saginaw, Mich.
Jeffrey Mfg. Co.	Columbus, Ohio
Johnston & Jennings Co.	Cleveland
Kindt-Collins Co.	Cleveland
Kolene Corp.	Detroit
H. Kramer & Co.	Chicago
Lancaster Iron Works, Inc.	Lancaster, Pa.
Lava Crucible Co. of Pittsburgh	Pittsburgh, Pa.
R. Lavin & Sons, Inc.	Chicago
Link-Belt Co.	Chicago

J. S. McCormick Co.	Pittsburgh, Pa.
Macleod Co.	Cincinnati
Magnaflux Corp.	Chicago
R. C. Mahon Co.	Detroit
Mahr Mfg. Co., Div. Diamond Iron Works, Inc.	Minneapolis
Mall Tool Co.	Chicago
Marathon Chemical Co., Div. Marathon Paper Mills Co.	Rothschild, Wis.
Mathews Conveyer Co.	Ellwood City, Pa.
Metals and Alloys, Reinhold Publishing Corp.	New York
Michigan Smelting & Refining Div., Bohn Aluminum & Brass Corp.	Detroit
Mid-West Abrasive Co.	Detroit
Milwaukee Foundry Equipment Co.	Milwaukee
Mine Safety Appliances Co.	Pittsburgh, Pa.
Modern Equipment Co.	Port Washington, Wis.
Monarch Engineering & Manufacturing Co.	Baltimore, Md.
Jas. A. Murphy & Co.	Hamilton, Ohio
Nassau Smelting & Refining Co., Inc.	New York
National Carbon Co., Inc., Carbon Products Div.	New York
National Engineering Co.	Chicago
National Gypsum Co.	Buffalo
Newaygo Engineering Co.	Newaygo, Mich.
New Jersey Silica Sand Co.	Millville, N. J.
Niagara Falls Smelting & Refining Corp.	Buffalo
Wm. H. Nicholls Co., Inc.	Richmond Hill, N. Y.
North American Smelting Co.	Philadelphia
S. Obermayer Co.	Chicago
Oliver Machinery Co.	Grand Rapids, Mich.
Osborn Mfg. Co.	Cleveland
Pangborn Corp.	Hagerstown, Md.
Parsons Engineering Corp.	Cleveland
Peerless Mineral Products Co.	Conneaut, Ohio
Penn-Rillton Co.	New York
Pennsylvania Foundry Supply & Sand Co.	Philadelphia
Penola, Inc.	Pittsburgh, Pa.
Penton Publishing Co.	Cleveland
Peters-Dalton, Inc.	Detroit
Geo. F. Pettinos	Philadelphia
Picker X-Ray Corp.	New York
E. W. Pike & Co.	Elizabeth, N. J.
Pittsburgh Crushed Steel Co.	Pittsburgh, Pa.
Pittsburgh Lectromelt Furnace Corp.	Pittsburgh, Pa.
Pollard Oil Products Co.	Milwaukee
Porter-Cable Machine Co.	Syracuse, N. Y.
Powermatic Ventilator Co.	Cleveland
Pryo Clay Products Co.	Oak Hill, Ohio
Pyrometer Instrument Co.	New York
Queen City Sand & Supply Co.	Buffalo
Radium Chemical Co., Inc.	New York
Ramtite Co., Div. S. Obermayer Co.	Chicago
N. Ransohoff, Inc.	Cincinnati
Reliable Pattern & Castings Co.	Cincinnati
Republic Coal & Coke Co.	Chicago
Republic Structural Iron Works	Cleveland
Robins Conveyors Inc.	Passaic, N. J.
Rotor Tool Co.	Cleveland
Royer Foundry & Machine Co.	Kingston, Pa.

Safety Engineering	New York
Sand Products Corp.	Detroit
A. Schrader's Son	Brooklyn, N. Y.
Claude B. Schneible Co.	Detroit
Schramm, Inc.	West Chester, Pa.
F. E. Schundler & Co., Inc.	Joliet, Ill.
Scientific Cast Products Corp.	Cleveland
Semet Solvay Co.	New York
Severance Tool Industries Inc.	Saginaw, Mich.
Simplicity Engineering Co.	Durand, Mich.
W. W. Sly Mfg. Co.	Cleveland
Smith Facing & Supply Co.	Cleveland
Smith Oil & Refining Co.	Rockford, Ill.
Werner G. Smith Co., Div. Archer-Daniels-Midland Co.	Cleveland
Spencer Turbine Co.	Hartford, Conn.
SPO, Inc.	Cleveland
Springfield Facing Co.	Springfield, Mass.
Standard Conveyor Co.	N. St. Paul
Standard Horse Nail Corp.	New Brighton, Pa.
Standard Sand & Machine Co.	Chicago
Steel Conversion & Supply Co.	Pittsburgh, Pa.
Steel Shot and Grit Co.	Boston, Mass.
Steelblast Abrasive Co.	Cleveland
Sterling Wheelbarrow Co.	Milwaukee
Frederic B. Stevens, Inc.	Detroit
Stroman Furnace & Engrg. Co.	Chicago
Swan-Finch Oil Corp.	New York
Syntron Co.	Homer City, Pa.
Tabor Mfg. Co.	Philadelphia
Taggart & Co.	Philadelphia
Tamms Silica Co.	Chicago
Thomas Truck & Caster Co.	Keokuk, Iowa
Tiona Petroleum Co.	Philadelphia
Titanium Alloy Mfg. Co.	Niagara Falls, N. Y.
Toledo Scale Co.	Toledo, Ohio
Tonawanda Iron Corp.	No. Tonawanda, N. Y.
Treat-Nantke Co., Inc.	No. Tonawanda, N. Y.
Tubular Micrometer Co.	St. James, Minn.
United Compound Co.	Buffalo
United Oil Mfg. Co.	Erie, Pa.
United States Graphite Co.	Saginaw, Mich.
U. S. Gypsum Co.	Chicago
U. S. Hoffman Machinery Corp.	New York
U. S. Reduction Co.	East Chicago, Ind.
Vanadium Corp. of America	New York
Vesuvius Crucible Co.	Swissvale, Pa.
Wadsworth Core Machine & Equipment Co.	Akron, Ohio
Western Metal Co.	Chicago
Wheelco Instruments Co.	Chicago
Whitehead Brothers Co.	New York
Whiting Corp.	Harvey, Ill.
Willson Products, Inc.	Reading, Pa.
E. J. Woodison Co.	Detroit
Yale & Towne Mfg. Co.	Philadelphia
Zanesville Sand Co.	Zanesville, Ohio

Copper Tubing Makes Thin-Walled Castings

IN ANSWER to an inquiry regarding whether or not brass tubing can be cast into thin-walled castings, we have been advised that this is possible by coating the copper tube with a very thin refractory coating and then placing the tube in the mold as a core.

Certain materials are on the market which are used for the purpose of coating the copper tubing. The purpose of the coating is to prevent the copper tubing from melting when contacted by the hot metal, and also to prevent possible gas generation from the surface of the tube.

It sometimes is advisable to pack the copper tubing loosely with sand. If packed loosely, the sand may be removed easily.

Castings Are a Front-Line War Material

By Alex Douglas, Peacock Bros., Ltd., Ville Lasalle, P. Q.

This paper, presented before a recent meeting of the A.F.A. Eastern Canada and Newfoundland Chapter, emphasizes the foundry's responsibility in producing sound castings, manufactured to government specifications. It also advocates the formation of a committee to serve as a "clinic" where foundrymen may feel free to present problems relating to the production of castings, and receive unbiased practical advice for overcoming difficulties peculiar to their methods of operation.

CASTINGS play a most important part in the successful execution of this war on land, on sea, and in the air.

The practice of melting metals and pouring them into sand molds is ancient. This is evident when visiting various parts of the old world, where many beautiful examples of the art of molding are to be seen in the form of statues and ornamental work in famous churches and cathedrals. Since those early days, much progress has been made, and every step in progress brings with it headaches to men. Today we are the front-line troops in a rapid advance, and the more rapid the advance, the more acute is the headache.

When a human being has a headache, he attributes the cause to everybody but himself. We, in the war industries today, are suffering from severe headaches, and we blame the men who write the specifications, test our materials, or condemn our product in operation. Instead, we ought to stop and think, "why all the fuss!"

Now let us get to the practical side of our business. This can be subdivided under three headings: (1) Specification, (2) Questionable, (3) Rectification. The writer wishes to elaborate to some extent on "Specification," since he thinks this causes more headaches and sore hearts than any other feature of our work.

Specifications

Let us consider the specification and let us be fair. Specifications are not written by men bound in red tape, as some people believe, but are the factual record of knowledge acquired from performances, satisfactory and unsatisfactory.

The main demands of any specification, as far as the foundry is concerned, are certain chemical analyses and physical characteristics of the materials from which the foundryman must produce his castings. Let us now consider why these requirements are necessary.

We all must have water and air to survive but, unfortunately, the two things to which the human being gives little consideration are water and air. The castings that we produce are subjected to water and air of varying compositions, temperatures, and pressures, each of which is a factor in determining the suitability of our product for the work that it is required to perform.

Gauging and testing cast crankshafts.

In many cases, materials may appear good under laboratory tests but, unfortunately, fail to make the grade when exposed to the severe, rigid and exacting tests of practice. Examples of this are common today.

In writing the specification, some leeway must be granted for mal-operation of the machine in service. This is why, in a number of cases, the people in authority are considered to be fussy and autocratic.

It has been stated that the only power capable of manufacturing a perfect machine would be the Almighty and, if He manufactured machines, His operative would be angels; but, as there are few angels on earth, the perfect machine in our hands would be mishandled.

The best we can produce, therefore, is according to the specification laid down by responsible people who are daily being guided by actual performances under the most severe conditions.

To overcome the forces of nature requires all the ingenuity of man but, when we add to these the destructive creation of man, then the

Brinelling small castings on a production testing unit.

problem is well-nigh superhuman. Materials, which in ordinary, everyday life may have proved capable of performing the work that they were called upon to do, are found to be entirely inadequate under the new conditions. The personnel writing specifications have, therefore, been subjected to a very severe test, and we, the manufacturers, often have not given them full credit for their work.

Changed Conditions—The specifications in existence when this war started were rigid, and the best known from a wide field of experience, but the war has changed our normal conditions and substitutes have had to be introduced due to the lack of accepted materials. This has involved the foundry industry in many problems, a large number of which are still unsolved.

The writer saw ships and factories that had been subjected to aerial bombing. In many cases, the ships and factories had not been hit directly, but they were "near misses."

The condition of main propelling machinery, auxiliaries, piping and shafting, carried away on shipboard, and the fractures of castings in heavy punching machinery, shearing machinery, and all types of machine tools, was hardly believable. Manufacturers were called in to examine the destruction, and they applied themselves to the problem of producing castings which would stand up to the new conditions. That is why we are being asked to do certain things which on the surface appear to be unreasonable.

Now let us consider that the specification is written, and we are asked to produce castings to meet the specification. Today, we have little spare time for going into all the minute details of the work which we are called upon to do. Our job is to get the work out as quickly, and in as large quantities as possible, without sacrificing quality.

Unfortunately, many of the men in responsible positions and workmen in the foundries are unfamiliar with the work that the castings must perform. This, in itself, is a very great handicap, and it behooves us to adhere as closely as possible to the specifications.

Trained metallurgists may see that proper mixtures are used, and test bars may be taken from the casting. These test bars may prove that the physical characteristics called for have been met. These, in themselves, are a good blueprint of the metal, but not of the casting.

To Scrap or Not to Scrap It?

This brings us to the point where we can consider the second heading —"Questionable."

Once a casting has been manufactured and any visible mal-formations, blowholes, or other defects are evident, it is imperative that these defects should not be covered up until an individual has been consulted, who is thoroughly familiar with the service the particular casting is to perform.

If a casting is for an ornament, patch it; if a casting may lose a man's life, scrap it!

Testing piston castings.

If the casting is apparently good, get it sand-blasted, cleaned, and into the production line. If a casting is doubtful, get the proper authority to give expert opinion on its suitability.

Salvage

If the decision is that the casting can be salvaged, this brings us to the third heading "Rectification."

Castings can be salvaged in various ways: (1) Welding (2) Burning (3) Doping (4) Metal Spraying. The type of salvage work to be carried out depends on the nature of the casting and the work it has to perform.

In the field with which the author is most familiar, viz., marine installations and steam plants, it has always been considered that welding, burning, doping, and metal spraying were emergency measures in the event of breakdowns, rather than a recognized practice in the manufacture of new machinery. Great strides have been made in the technique of welding and, provided the casting is welded by a man thoroughly conversant with his art, many castings can be successfully salvaged.

Consider Working Conditions

The working conditions of castings should be thoroughly considered before any repair is performed. Let us, for example, take the case of an ordinary reciprocating pump. The water cylinder is subjected alternately to discharge pressure and suction pressure. This naturally causes a breathing action on the walls of the cylinder. If there are any unequal strains existing in the walls of the cylinder, the possibilities of a breakdown are very great. If a water cylinder has been repaired, the casting should be normalized to make sure that all stresses have been released.

Non-ferrous alloys are adaptable for burning, but the burning must be done by men well qualified and experienced in the art. Recently, we had a casting burned by a trained molder, under the supervision of men well versed in non-ferrous alloys. After burning, the casting was subjected to a hydraulic pressure, was thoroughly rapped, and appeared to be entirely satisfactory. The pressure was allowed to stand in the casting for 24 hours and

the writer examined the casting and considered it satisfactory.

When the machine was assembled and put under actual working conditions, it was again examined, and when rapped with a hammer, the casting cracked. Normally this casting might have been allowed to go into service, and would have been accepted by the responsible authorities. This makes one think.

In various trade journals, in connection with the foundry industry, we see advertisements and technical papers on the doping of castings. Should we, in the foundry industry, take this as a compliment? Has the world in general come to the conclusion that we are incapable of making sound material? Or have the foundrymen been doped? Surely we should not take these signs of our imperfections lying down!

Generally, in cases where the "death rate" in castings of a particular type is very high, the procedure in arriving at a satisfactory solution should be to ascertain if:

1. The design is correct from a foundry point of view.

2. The method of molding, gating and venting is correct.

3. The temperature of pouring is correct.

4. The right type of sand is being used for the cores.

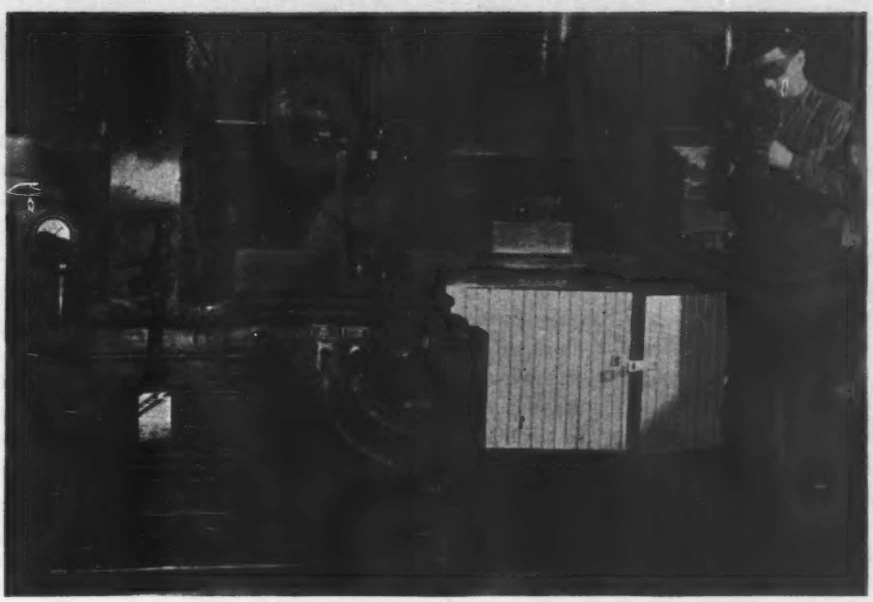
PLAN DESIGN

In the manufacture of any machine, the method employed in most organizations is to design for mass production by modernized high speed machine tools. Surely the foundry is entitled to be given more consideration when a design is being considered. The foundryman, in the writer's opinion, has not been forceful enough in emphasizing the important part he plays in production for the metal industry. How many concerns have a foundry planning department, or something comparable to a tool room in a modern machine shop?

For over 50 years, the company with which the writer is associated has been making machinery for ships and power plants, which have become world famous. The designs are the result of hard, bitter experience with exacting sea conditions, and represent the best that can be produced, based on knowledge accumulated to the present day.

Since coming to Canada, the writer has heard it expressed on various occasions that we in the United Kingdom are inclined to be conservative and, in some cases, non-progressive. All our products are designed after consideration by our foundry planning department in conjunction with our machine shop production department, and the final design is not decided upon until all parties concerned have expressed their views. The writer would like to emphasize that the ingenuity of the machine tool designer can overcome many machining difficulties, if the design is such that it improves foundry technique.

It must be admitted that many foundries are simply producing castings and not machining them. The designer, therefore, meets his own shop conditions without ever considering good, sound, practical foundry methods, and, in most cases, never gives the foundry personnel a chance to discuss it.



Quality must not be sacrificed for the sake of speed.

A CONSULTATION BOARD

It appears to the writer that, in all cases where difficulties are being experienced with the production of good castings, a committee of your society should be formed and the foundry concerned should put its problem before this committee of experienced men, so that they can give their considered advice on what method should be adopted to overcome the difficulty.

This, in no case, should be considered a confession of weakness, but every foundryman should consider this committee as important to his organization as a trowel is to his workmen. A doctor, when feeling off color, does not hesitate to consult another doctor!

In this way many valuable man hours, both in foundries and in machine shops, would be saved, and the accumulated knowledge would be of immense value to the industry as a whole.

In the writer's varied experience, which has taken him to many countries under many different types of conditions, he has witnessed numerous failures of materials. He has seen the forces of nature playing havoc with man-made machines. Castings that normally would take our most powerful presses to fracture have been split asunder by an overnight frost. The persistent actions of erosion and corrosion, which are never ceasing, have caused well-designed and well-made machines to fall to pieces.

The writer has seen metals given a rigorous laboratory test, and also a continuous running test in an experimental shop and, according to the laboratory test and the working test, the material appeared to be absolutely suited to the work for which it was intended. When fitted on ships or on some foreign installation where a new set of conditions arose, the material proved to be inadequate. It is only by the hard road of practical application that we can get anywhere in the metal field.

TEAMWORK NECESSARY

To attain the best results at all times, the ideal team should consist of good technical men allied to good

practical men. Neither on their own can supply the answer.

The writer has deliberately refrained from making any statements regarding the castings with which he is in daily contact, as he fully appreciates the many difficulties under which we are all working today, and any discussions must be individual rather than collective, as each foundry has a different set-up.

In all our dealings with castings, we should always put ourselves in the position of the purchaser, and we should not expect any man to buy something that we would not buy ourselves.

At this very moment, a ship may have had a signal to proceed to sea at once. It may be standing cold and all the machinery has to be started up immediately. The strains that are imposed on all parts of the machinery under this condition are tremendous. That is why we should make certain that the very best, with no faking, is aboard.

At this moment, too, some of our sons may be in the air and have to ask their planes to perform some sudden maneuver to save their lives. If material failure takes place, the result is tragic.

Again, at this moment, batteries of artillery and squadrons of tanks may be ordered over terrain that will introduce strains and stresses which tax to the limit all the material. Any failure may be the difference between losing or winning a battle.

Conclusion

In conclusion, the writer would like to leave a thought with the foundrymen: In all cases where castings are being made for vital war equipment, the foundryman should ask himself whether he would be willing personally to go into action on land, on sea, or in the air, with the product he is proposing to deliver to the armed forces.

There is no mystery about good castings. They should be produced by applied common sense. Unfortunately, applied common sense is slightly obscured, mostly by the profit and loss ledger.

Let's stop fussing and, above all, let us be practical.

Rapid Qualitative Tests for Core Sand Addition Agents

By O. Jay Myers, Wright Aeronautical Corp., Lockland, Ohio

AN IMPORTANT function of any sand laboratory is the rapid qualitative determination of any addition agent to a core sand mixture. In magnesium foundry practice, inhibitors are frequently used in the sand mixtures. Former complicated formulae are even more complex now, because of these extra additions.

Rapid routine checks frequently must be made to ascertain whether or not all the ingredients have been added to the sand during the mixing cycle. The following scheme is derived from elementary chemical principle.

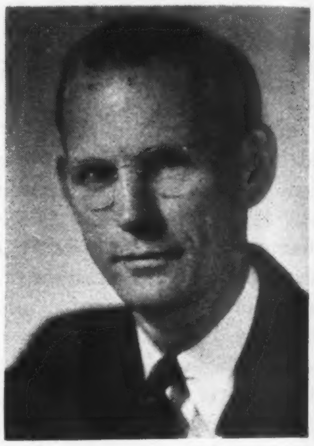
For any of the tests, place approximately 15 grams of the unbaked core sand mixture in a 6-inch test tube. Thoroughly mix the reagent with the sand and indicator.

TEST	REAGENT (30 cc)	INDICATOR (5 drops)	CONFIRMATION
Cereal Binder	Hot Tap Water	Iodine Solution	Blue Solution
Core Oil	Carbon Tetrachloride		Tan Solution
Boric Acid	Alcohol		Green Flame (when a drop of the solution is burned on a glass rod)
Sulphur	Alcohol	Wetting Agent (Tergitol)	Yellow Ring on top of the sand beneath flocculated cereal binder

A.F.A. Chapter Director Serves Section of W.P.B.

E. C. HOENICKE, Eaton Mfg. Co., Detroit, has been appointed to direct, as industry consultant, the newly created gray iron castings section of the W.P.B.

Mr. Hoenicke, who entered the foundry field in 1916, is a director of the Detroit chapter of A.F.A. and



E. C. Hoenicke

chairman of the publicity committee of the Gray Iron Founders' Society.

Also named to the new section was A. Douglas Hannah, associated with W.P.B. since May, 1942, as assistant to the chief of the pig iron section. Mr. Hannah is a director of the Barnett Foundry & Machine Co., Irvington, N. J.

Issues Guide as Aid in Preparing Papers

IN an effort to assist those who prepare technical data for presentation at annual meetings of A.F.A., the Association has issued a "Guide to Authors in the Preparation and Presentation of Technical Papers to the American Foundrymen's Association." This guide has been prepared at the instigation of the Technical Activities Correlation Committee and has been approved by the Board of Directors.

Copies of the guide have been supplied to members of the Board, the Technical Activities Correlation Committee, chairmen of all division and general interest committees and the membership of all program and papers committees. It is intended to supply a copy of the guide to each prospective author of a paper to be presented before the Association.

Skin Drying Molds with Infra-Red Lamps

By H. B. Voorhees, Dodge Mfg. Co., Mishawaka, Indiana

The pratice of skin drying molds by a simplified adaptation of infra-red lamps solved the problems of a foundry, where the quantity of orders did not justify installation of extensive drying equipment. This drying method was originally adopted as an economy measure and space saver.

ABOUT June, 1940, we were having some difficulty in skin drying molds with kerosene torches. This was largely due to a lack of efficient labor to operate the torches and, with this poorer class of workmen, we occasionally were producing castings with scabs. These scabs were entirely due to spots on the molds that, from all outward appearance, were dry. Actually, however, they were not dry.

Having no oven available, nor space for same, to dry these molds and, having to make the most of the molds in wooden flasks because the quantities on the orders did not permit large expenditures for flask equipment, we were forced to dry the molds on this type of work with pans of charcoal or with the kerosene torch. Neither method was found very satisfactory.

Lamp Drying

We then started to experiment with infra-red lamps (250W reflector drying lamps), using the same mixture of facing sand as was used with the other drying methods. The lamps were placed on 6-in. centers, 4 to 6-in. from the mold, following as near as possible the contour of the mold (Figs. 1A and 1B).

In this way, we found that the molds would dry (Figs. 2, 3, and 4) about one-in. deep in approximately 45 min. This means that the cost for drying will be somewhat less than one kilowatt-hour to dry an area of one sq. ft.

It has been stated that the regular lamps with separate reflectors are somewhat better than the ones we use (reflector type), but this adds an extra job of cleaning which, we believe, offsets any advantage or gain.

Our lamps are all mounted on simple, inexpensive wood frames which can be adjusted and handled with ease. Also, in case of a short circuit in the wiring, the danger of a serious accident is greatly reduced. We have used in our plant, since 1940, small banks of lights with six lamps up to large ones with 150 lamps (Figs. 3 and 4), and find the results about the same on all sizes.

Mold Blacking

One minor advantage in infra-red drying is in the mold blacking operation. The molds are blackened with a good grade of blacking, which is sprayed on. Then, with camel hair brush and plain water, it is brushed completely (a very short operation). Next, it is ready for drying. When dried, the blacking is a hard skin which does not break, chip or wash, whereas we have had blacking become a powder and wash away during pouring because it had been torched in one particular spot for too long.

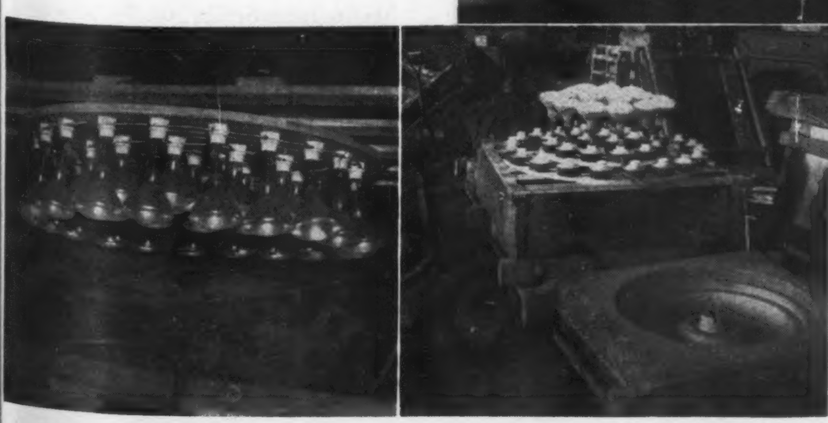
Disadvantages of Method

A few disadvantages of infra-red drying methods which should not be overlooked are:

1. The bulbs (or lamps) are very fragile and, as most men in the foundry handle tools roughly precautions must be taken to guard against damage.

2. Molds having deep narrow recesses with vertical sides are difficult to dry, and sometimes it becomes necessary to touch these up with a torch after removing the lights. However, we have dried jobs satisfactorily with recesses 6-in. deep without torching.

It is important that the lamp banks be inspected before turning off the current to be sure that all lamps are burning. If any lamps have burned out, the mold should be in-



Figs. 1A and 1B—Placing lights on flywheel molds (1A); large pyramid of lights can be used for a number of sizes, by leaving off outer row of lamps (1B).

Fig. 2 (above)—Drying molds of flywheels, weighing 2800 lb. each.

Figs. 3 and 4—A stern tube for Liberty Ship, weighing about 4 tons and using 150 lamps to dry.

spected carefully for any spots which are not dried thoroughly or spots which are only surface dried.

Molding Sand

At present the sand heaps are composed mainly of local coarse sand with southern bentonite added for bond. It is the purpose to maintain these heaps at about 6 per cent moisture, 0.71 permeability and 6.6 psi. green compression strength.

Facing Sand

The facing sand mixture used on small castings to be dried is as follows:

Michigan lake sand (Michigan City), 3 cu. ft.
Old heap sand (coarse), 2 cu. ft.
Western bentonite, 12 lb.
Seacoal, 12 lb.
Glutin water (½ to ½), 1 qt.
Wheat flour, 2 qts.

This mixture has a moisture content of 5.4 per cent, permeability of 100, and a green compression strength of 12.3 psi.

For large molds, where castings weigh 3 to 4 tons, the heaps are built up with New Jersey sand, which keeps the permeability up and also the strength. The following facing sand mixture is used on jobs of this type:

Michigan lake sand (Michigan City), 3 cu. ft.
New coarse sand (coarse), 2 cu. ft.
Western bentonite, 12 lb.
Seacoal, 12 lb.
Glutin water (½ to ½), 1 qt.
Wheat flour, 2 qt.

This mixture has a mosture content of 5.6 per cent, permeability 130, and a green compression strength of 12 to 14 psi. This method of infra-red drying has served as a satisfactory solution to our problems.

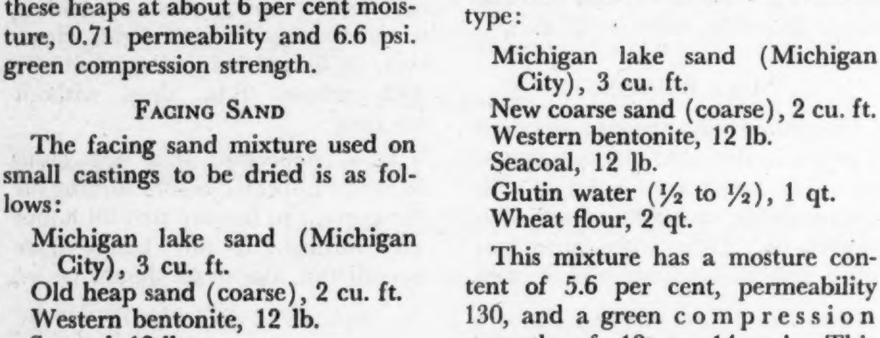


Fig. 5—Brushing and drying molds of impeller and runner castings of hydraulic clutches. High strength iron, thin section castings, poured at 2650°F.

Case School Conducts Course in Metal Castings

THE Case School of Applied Science, Cleveland, is conducting a course, "Metal Castings for Designers," under the Engineering, Science and Management War Training Program of the Federal Government.

Planned for design engineers, the course has as its purpose the training of such men in the problems of metal casting and the properties of castings, both ferrous and non-ferrous.

Of 16 weeks duration, one night each week, the course consists of lectures, demonstrations in the college foundry laboratories, and inspection trips.

G. B. Carson, Associate Professor of Industrial Engineering at the college, is supervising the program, which is being taught by E. J. R. Hudec, instructor in Industrial Engineering.

Book Review

Tungsten, by K. C. Li and C. Y. Wang, American Chemical Society Monograph Series No. 94, blue cloth bound, 325 pages. Published by Reinhold Publishing Corporation, New York. Price, $7.00.

This volume is a detailed presentation of present day knowledge of tungsten. The authors have discussed the history, geology, ore dressing, metallurgy, chemistry, industrial applications, and economics of tungsten, and tungsten substitutes. Appendices give terms of purchase of tungsten ores, originating in the different producing countries.

A Review of Analyses for Gases in Steel

By Clarence E. Sims and Geo. A. Moore, Battelle Memorial Institute, Columbus, Ohio

Both British and American scientists have been interested in the problem of gases in metals. The Committee on the Heterogeneity of Steel Ingots, British Iron and Steel Institute, and the British Iron and Steel Federation, is the English organization which has undertaken to gather information on, and keep step with, the development of data on that subject.

The following article is a review of the Fourth Report (paper No. 22, July 1943) of the Oxygen Subcommittee of the previously-mentioned committee. The authors are well known to American foundrymen, and are well qualified as reviewers of the report, because of their long interest in both the determination and effect of gases on the physical properties, primarily of steel.

THIS report presents an exhaustive discussion of current methods of analysis for oxygen, nitrogen and hydrogen in steel, as practiced in England, and of the results being obtained by use of the various methods.

A total of 30 contributions by 17 individual authors offers reports on the use of six distinct methods for the determination of oxygen, two methods for hydrogen, and two for nitrogen. A large number of analytical results are reported for the purpose of comparing and standardizing the methods. In addition, the various methods are applied to ten problems of technical importance.

The wide field covered makes this report necessary reading for all who engage directly in the determination of the gases in steel, or who have occasion to consider the results of such determinations. The report fails to attain the status of a complete handbook only in that the basic arrangements of some of the methods are not described in sufficient detail, and that the reader is thus left in some doubt as to the exact processes being followed. In most cases, however, the methods have been covered in detail in the previous reports of the series; hence, their present omission is not serious.

Determination of Oxygen

In their reports on vacuum fusion methods, Sloman, Swinden, Stevenson, and Speight call attention to several possible causes of inaccuracy and emphasize the care necessary in interpreting the results. Of particular interest is the observation that, in alloys with manganese, molybdenum, copper, nickel, and aluminum, these metals tend to vaporize and form films in the cool parts of the apparatus.

In the presence of these films, gases subsequently evolved are absorbed by the walls of the apparatus, leading to analyses as much as 75 per cent lower than the true values. This difficulty was only surmounted by dismanteling and cleaning the apparatus between each run.

Precautions Are Necessary

Tungsten and silicon, in excessive quantities, were also observed to introduce errors. In an attempt to standardize the fractional fusion method as a means of distinguishing the various oxides, the use of synthetic samples of known composition has been introduced. As currently used, it appears that the iron-oxide values may be considered low, the manganese-oxide values high, and the values for silicon, alumina, and other stable oxides somewhat low.

In discussion of the various halogen combustion residue methods, Colbeck, Craven, Rooney, Speight, and Westwood call attention to several of the precautions that must be taken to obtain correct results. It appears that essentially correct results are obtained by the chlorine combustion method at 662°F., when allowance is made for the contamination with a portion of Cr_2O_3. Results at higher temperature are probably erroneous.

Analysis of the residue after solution in alcoholic iodine appears to give reasonable results except for some difficulty with phosphorus. Of considerable interest is a table of oxygen contents of several steels of varying carbon content, in which the oxygen content varies directly with the carbon over a range of 10 to 1. Vacuum fusion results on the same steels vary only over a range of 3 to 1. When these data are plotted, the very good correlation between oxygen content by alcoholic iodine and the carbon content make an impressive contrast with the complete lack of such correlation shown by the oxygen from vacuum fusion analysis.

This correlation, incidentally, is positive, which is contrary to the accepted equilibrium constant for carbon and oxygen in iron. It may be true, as the author infers, that the alcoholic iodine results are due to a systematic error introduced by the carbon, and methods were worked out to reconcile the two sets of data, but it is probable that neither method should be wholly accepted or rejected, and both should be considered.

The combined opinion of the nine papers on oxygen would appear to indicate that all of the methods used are useful, in that they yield results which are more often than not reasonable. It is, however, to be noted that they all have important sources of error which must be recognized and guarded against, and that there are ranges of composition in which the application of each method is open to question. When used together, as has been done in this report, the various methods in most cases give oxygen analyses which can be accepted with considerable confidence.

Determination of Hydrogen

While the determination of hydrogen is a new project for the Oxygen Sub-Committee, the presence on the committee of such men as Andrew, Quarrell, and Newell, who have worked for some time in both the fields of hydrogen analysis and the effect of hydrogen on steel, insures that the work has been undertaken with full knowledge of the care necessary in both operation and interpretation.

In his general discussion of methods, Newell passes over combustion and other possible methods with a disregard, which the reviewers consider may not be completely justified. However, his critical discussion of the various vacuum extraction methods, and of the preparation and handling of samples, leaves little to be desired.

It would appear that Newell finds no reason to distrust the vacuum fusion determination of hydrogen as

a general method, although he calls attention to the high blank values caused by the use of high temperature and notes that the results are both inaccurate and unreliable when the measured hydrogen content is low. As he also calls attention to the rapid loss of hydrogen from samples of high original content, when stored at room temperature, it is clear that he would not rely on results for such steels, if obtained by the usual technique wherein several samples are introduced into the apparatus and exposed to the vacuum for extended periods.

Vacuum-Heating Methods

The experimental reports by Newell, Stevenson, Speight, Colbeck, and Craven are devoted to the use of vacuum-heating methods; i.e., the extraction of the gas from solid steel at temperatures in the neighborhood of 1112°F. These reports are of special interest for their descriptions of some very clever methods of solving the mechanical difficulties attendant on the rapid introduction of a sample, without loss of its gas content and without the necessity of repeated degasing of the systems. The methods of measuring the evolved gas also appear to be very convenient.

Proof is given of the very low blank values obtained with such apparatus, this guaranteeing sensitivity and accuracy for determinations of low hydrogen content. Presumptive evidence is shown that an analytically complete extraction is obtained in one or two hours of operation.

Accuracy Based on Consistency

However, in common with all the other methods, the evidence of accuracy is based on internal callibration and consistency, since no attempt has yet been made to use primary standards of independently established hydrogen content. Until independent checks, such as are being applied to oxygen methods, are also applied to the hydrogen methods, confidence in these methods must be based on belief in their applicability rather than on proved knowledge of their accuracy.

Lending support to confidence in the methods is the notion that progressive and regular decreases were noted for the hydrogen content of some steels over a period of aging at room temperature. A progressive decrease also was found in the same heat of steel as it progressed from the ingot through various stages of hot rolling and annealing. Such determinations are in obvious agreement with the behavior that could logically be expected.

Much less reassuring, however, are results from a single laboratory where successive analyses of samples from the same piece of steel give vacuum-heating results varying by 50 per cent. These may be due to local differences in the steel, as suggested in the report, but may equally well be due to variations in the analytical process.

In a later contribution, giving results on several commercial steels, it is discovered that the analyses performed in different laboratories vary by 400 to 600 per cent in the vacuum-fusion method, and by 100 to 300 per cent in the vacuum-heating method.

In view of these discordent results, it is the opinion of the reviewers that the evidence so far presented is not sufficient to lead to a presumptive belief in the reliability of the methods used.

Congratulations for British

It is, however, felt that the British committee is to be congratulated on the understanding with which they have undertaken the analysis for hydrogen, on the care with which they have worked out their methods and the cleverness which has been shown in solving some of the mechanical difficulties, and on the honesty with which they have reported results which must have been disappointing to the operators. The work reported constitutes at least a long step in the direction of evolving a reliable method of hydrogen analysis.

Determination of Nitrogen

The critical examination of methods for the determination of nitrogen again represents a new venture for the Oxygen Committee. The previous experience of several of the members, however, assures that the new project has been undertaken in a competent manner.

While previous results by the vacuum-fusion method have been reported to the committee, the bulk of the present report refers to efforts to standardize the chemical distillation method. It is reported that several variations give reliable results, except in the case of steels containing titanium, wherein titanium nitride or some related compound fails to decompose in those methods where solution of the steel is accomplished by the use of dilute acids.

A standard method is evolved using fuming sulphuric acid with potassium bisulphate for the complete solution of the steel, followed by distillation of the ammonia from caustic soda and determination either by titration or colorimetric methods. With this method, the nitrogen analyses are reported to be satisfactory on all steels tried. Independently established standard samples were used as needed.

Comparison of Results

Upon comparing the results of vacuum-fusion determinations with chemical determinations by the approved methods, it is shown that the vacuum-fusion determinations tend to be low by the order of 0.0015 per cent, which is about 25 per cent of the amount of nitrogen usually present.

Upon submitting the residue from vacuum-fusion determinations to analysis by the chemical method, the missing portion of the nitrogen was found to be retained in this residue. A table of the results on several steels in various laboratories using several modifications of the methods, confirms the finding that the vacuum-fusion results are practically always low by more than the probable error of measurement.

Examination of Materials

The results by all methods were reported by Swinden, using the data of several laboratories. It appears to be the opinion of that writer that the future of nitrogen analysis in steel lies in further refinement of the chemical method. As he has been for some time a user and advocate of the vacuum-fusion method for other gases, it would appear that his verdict on nitrogen can be accepted without reservation.

In this section, various authors report on such subjects as the production of oxygen-free iron for use in standardizing the analytical methods, on examinations of rimming steels, alloy steels, and transformer iron; on surface oxide films, oxide inclusions, and the oxide constituent of slags; and on the gas content of raw materials used in steel making.

The various tables of results of these investigations can hardly be reported in detail, but will be of interest to those who have occasion to deal with the specific problems treated. Probably of most general interest is the fact that the contents of oxygen, hydrogen, and nitrogen reported for the various ferro-alloys and other raw materials are, in general, several times higher than would be tolerated in the finished steel. Knowledge of these gas contents would appear to be very important to any attempt to produce steel of lower than average contamination.

Gases in Liquid Steel

A report by Swinden and Stevenson on the oxygen content of liquid steel presents numerous analytical results using the aluminum reduction-bomb method of sampling. No difficulty with the method was experienced, and reliable determinations appear to have been obtained using both vacuum-fusion and chemical methods for the determination of the resulting alumina. The report considers the method used more reliable than any alternate procedure.

A report by Hatfield and Newell on the determination of hydrogen in liquid steel introduces the use of a novel device called a "Balloon Tube," whereby the gas evolved during the solidification of the steel sample is collected in a rubber balloon, analyzed separately, and the hydrogen added to that obtained from the solid metal.

As the tabulated results show that from 10 per cent to 80 per cent of the gas in the steel is evolved into the balloon under various cooling conditions, the importance of this precaution is now obvious. The solid metal was analyzed by the vacuum-fusion method but, with the addition of the gas collected by the balloon, the possible errors of this analysis are unimportant, and the combined results are of considerable interest in reflecting conditions in the steel furnace at various stages of the steel making process.

Experiments in the same report, on the use of rapidly chilled "pencil" samples from the liquid steels, conclusively show that the analysis of such samples give very little information on the hydrogen content of the liquid steel.

Summary

From the large number of reports submitted by the various members and associates of the British Oxygen Sub-Committee, these reviewers conclude that sufficient information on methods, precautions, and results has been given to establish the reliability of both the vacuum-fusion methods and some of the chemical methods for determining the oxygen content of steels of ordinary compositions when sampled in either the solid or liquid state. The information on the special precautions to be observed is considered of particular value.

From the reports of nitrogen, it is concluded that the one recommended chemical method may be considered reliable when applied to solid samples over a reasonable range of heat-treatment history and composition. It is considered that the data have shown the vacuum-fusion method to be inapplicable under ordinary conditions.

While the reports on hydrogen do not appear to establish the reliability of any method so far used, the results may be considered useful and enlightening in certain cases, while the reports of methods may be considered very valuable to the further development of methods for the analysis of this element. The information on the loss of hydrogen from steel samples while standing at ordinary temperature, and on the collection of the hydrogen evolved during the solidification of liquid samples, is considered of particular importance to all future attempts to determine this gas.

Book Review

Diesel Locomotives — Mechanical Equipment, by John Draney. Green cloth bound, 472 pages, 220 illustrations. Published by American Technical Society, Chicago. Price $4.00.

Anyone wishing to learn about servicing, maintenance, and operation of modern Diesel locomotives, as well as men in railway and industrial employ, should find this book interesting and worthwhile. In the preparation of this book many men who are associated with railroads and Diesel locomotive manufacturing concerns assisted the author whose experience qualifies him to present the subject.

The author discusses characteristics of engine cycles, combustion principles in modern Diesels and high-speed Diesels, fuel-injection nozzles and pumps, lubricating and cooling systems, governors, supercharging and turbocharging, and air filtration. Chapters on particular makes of locomotive Diesels discuss the operation and characteristics of the Caterpillar Diesel, Cummins Diesel, Hercules Diesel, Cooper-Bessemer Diesel, American Locomotive (McIntosh and Seymour), Baldwin Locomotive Diesel (De La Vergne), General Motors Diesel (Electro-Motive Division), and Fairbanks-Morse High-Speed Diesel. Also included in the book are chapters on description and operation of Diesel locomotive mechanical equipment, maintenance instructions, trucks, auxiliary equipment, and Vapor-Clarkson steam generating units.

New Association Members

(January 16 to February 15, 1944)

Evidently there is a lot of pre-convention activity among Chapter Membership Committees, for 136 new names are now in the A.F.A. files, representing work in the January 16-February 15 period. This count included 28 company members, which is an excellent showing. Chicago took the lead with 14 new members; Rochester was second, with 13, and Eastern Canada and Newfoundland and Metropolitan share honors for third place, with 10 each.

CONVERSIONS

Sustaining from Company

†Reading Steel Casting Div., American Chain & Cable Co., Inc., Reading Pa. (Lee C. Wilson, Gen. Mgr.).

BIRMINGHAM CHAPTER

Gerald Cohen, Met. & Asst. Supt., M & H Valve & Fittings Co., Anniston, Ala.
***DeBardeleben Coal Corp., Birmingham, Ala. (A. W. Vogtle, Mgr., Traffic-Sales).**
J. B. Lankford, Jr., Mgr., East Birmingham Bronze Co., Birmingham, Ala.
***Lodge Mfg. Co., South Pittsburgh, Tenn. (C. R. Kellerman, Vice Pres.).**

CENTRAL INDIANA CHAPTER

Darrell Cress, Foreman, National Malleable & Steel Castings Co., Indianapolis.
***Foster Pattern Works, Columbus, Ind. (Lowell E. Engelking, Partner-Manager).**
G. Delbert Johnson, Met., Delco-Remy Div., General Motors Corp., Anderson, Ind.
John Koehl, Asst. Prodn. Mgr., National Malleable & Steel Castings Co., Indianapolis.
Robert T. Miller, Foreman, National Malleable & Steel Castings Co., Indianapolis.
Lloyd P. Morgan, Foreman, National Malleable & Steel Castings Co., Indianapolis.
Fred Schwier, Foreman, National Malleable & Steel Castings Co., Indianapolis.
Roy Staples, Foreman, Foster Pattern Works, Columbus, Ind.
Virgil A. Worrell, Foreman, National Malleable & Steel Castings Co., Indianapolis

CENTRAL NEW YORK CHAPTER

Bruce R. Artz, Dist. Mgr., Pangborn Corp., Syracuse, N. Y.
Luther S. Caldwell, Elmira Foundry Co., Inc., Elmira, N. Y.
James A. Ogden, Fdry. Supt., Ames Iron Works, Oswego, N. Y.
William P. Ward, Project Engr., Oberdorfer Foundries, Inc., Syracuse, N. Y.

CHESAPEAKE CHAPTER

Commanding General, Attention Tech. Information Branch, Aberdeen Proving Ground, Md.
Richard H. Harwell, Molder, U. S. Navy Yard, Washington, D. C.

CHICAGO CHAPTER

Joseph Armata, Pres., Junior Foundrymen of America, Washburne Trade School, Chicago.
Albert H. Audette, Foreman, Continental Roll & Steel Foundry Co., East Chicago, Ind.
John Brazina, Foreman, Continental Roll & Steel Foundry Co., East Chicago, Ind.
LeRoy Dammeyer, Asst. Met., Pettibone Mulliken Corp., Chicago.
William H. Dashiell, Salesman, Kindt-Collins Co., Cleveland.
John S. Joyce, Foreman, Heat Treating Dept., Continental Roll & Steel Foundry Co., East Chicago, Ind.
John Kertis, Foreman, Continental Roll & Steel Foundry Co., East Chicago, Ind.
Edward J. Kilfoyle, Chicago Hardware Foundry Co., North Chicago, Ill.
Vernon F. Lane, Foreman, Magnesium Div., Howard Foundry Co., Chicago.
Elmer V. Lanfranke, Asst. Supt., Howard Foundry Co., Chicago.
Donald Longanecker, Secy., Junior Foundrymen of America, Washburne Trade School, Chicago.
Leonard Shaw, Gen. Foreman, National Malleable & Steel Castings Co., Cicero, Ill.
A. N. Volk, Sales Mgr., Newaygo Engineering Co., Chicago.
Richard P. Weber, Burnside Steel Foundry Co., Chicago.

CINCINNATI DISTRICT CHAPTER

Adolph Kiefer, Ohio Pattern Works & Foundry Co., Cincinnati.
Michael Krauser, Ohio Pattern Works & Foundry Co., Cincinnati.

DETROIT CHAPTER

Peter M. Sanders, Met. Engr., Ford Motor Co., Dearborn, Mich.
Woodrow George Turner, Ind. Engr., Aluminum Company of America, Detroit.
Claude A. Welles, Jr., Ind. Engr., Aluminum Company of America, Detroit.
Bonheur M. Weston, Consulting Engr., Detroit.

*Company members.
†Sustaining members.

EASTERN CANADA & NEWFOUNDLAND CHAPTER

***Aluminum Foundry & Pattern Works, St. Laurent, Que. (W. B. Chadwick, Mgr.).**
Joe Beauchamp, Inspector, Joliette Steel, Limited, Joliette, Que.
H. I. Cornell, Mgr., Webster & Sons, Limited, Montreal, Que.
***Courtenay Iron & Brass Foundry, Saint John, New Brunswick (Paul Harrigan, Asst. Mgr.).**
P. A. Dauncey, Foundry Supt., Union Screen Plate Co. of Canada, Ltd., Lennoxville, Que.
G. Ross Gustin, Mgr. of Factories, Crane, Limited, Montreal, Que.
J. G. Hunt, Met. Dept., Dominion Engineering Works, Ltd., Lachine, Que.
John Riley, Core Room Foreman, Warden King, Ltd., Montreal, Que.
Paul B. Savoie, Salesman, Webster & Sons, Ltd., Montreal, Que.
Alex Watson, Foreman, Canadian National Railways Foundry, Montreal, Que.

METROPOLITAN CHAPTER

Walter T. Battis, Res. Met., American Smelting & Refining Co., Barber, N. J.
Henry J. Chapin, Asst. Met., American Brake Shoe Co., Mahwah, N. J.
George E. Connolly, Vice Pres., Nichols Engineering & Research Corp., New York.
John Kalpin, Asst. Supt., Eclipse Foundry, Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Russell G. McMillen, Chief Met., Eastern Casting Corp., New York.
***Nichols Engineering & Research Corp., New York, N. Y. (Fred B. Schilling, Vice Pres.).**
Raymond Olson, Foundry Processing Engr., Sperry Gyroscope Co., Inc., Lake Success, Long Island, N. Y.
Alex G. Tobia, Core Room Supv., Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
A. Scott Tucker, Devl. Met. Engr., General Electric Co., Lynn, Mass.
Bert Wales, Asst. Treas., Nichols Engineering & Research Corp., New York.

MICHIANA CHAPTER

Ray P. Bauer, Castings Buyer, Sullivan Machinery Co., Michigan City, Ind.

NORTHEASTERN OHIO CHAPTER

Lawrence M. Carey, Foundry Foreman, Lake City Malleable Co., Cleveland.
Eldon S. Clark, Foundry Engr., Meehanite Metal Corp., Cleveland Heights, Ohio.
W. W. Hoover, Machined Steel Casting Co., Alliance, Ohio.
Howard L. Larson, Dev. Engr., National Carbon Co., Cleveland.
Carl F. Richmond, Supt., City Foundry Co., Cleveland.
Vincent L. Thompson, Tech. Engr., U. S. Graphite Co., Cleveland.
Wilfred H. White, Met., Jackson Iron & Steel Co., Jackson, Ohio.

NORTHERN CALIFORNIA CHAPTER

N. M. Briskin, Field Engr., Permanente Metals Corp., Permanente, Calif.
Geo. E. Dalbey, Assoc. Met., U. S. Navy Yard, Mare Island, Calif.
***Machined Steel Casting Co., Alliance, Ohio (F. K. Donaldson, Vice Pres.-Gen. Mgr.).**
Joseph L. Melling, Foreman, H. C. Macaulay Foundry Co., Berkeley, Calif.

ONTARIO CHAPTER

Jack Gribbon, Gray Iron Foreman, International Malleable Iron Co., Ltd., Guelph, Ont.
***Leeder's Limited, Winnipeg, Man. (C. H. Leeder, President).**
J. Ferrier Ross, Asst. Mgr., Ross & Howard Iron Works Co., Ltd., Vancouver, B. C.
Chester C. Slugocki, Molder, Canadian Pacific Railway, Weston Shops, Winnipeg, Man.

PHILADELPHIA CHAPTER

Garton L. Crumrine, Chief Chem., North American Smelting Co., Philadelphia.
†Reading Steel Casting Div., American Chain & Cable Co., Inc., Reading, Pa. (Lee C. Wilson, Gen. Mgr.).
John Joseph Traynor, Foreman, North American Smelting Co., Philadelphia.

QUAD-CITY CHAPTER

Harold Brady, Partner, Brady Co., Rock Island, Ill.
***Burns Brass Foundry, Peoria, Ill. (E. J. Burns, Owner).**
***Iowa Valve Co., Oskaloosa, Iowa (A. W. Read, Treas.).**
F. Wallace Johnson, Prodn. Engr., Iowa Valve Co., Oskaloosa, Iowa.
***Keokuk Steel Casting Co., Keokuk, Iowa (Harry D. McChesney, Secy.-Treas.).**
***South Side Foundry, Peoria, Ill. (John M. McCarthy, Jr., Partner).**

ROCHESTER CHAPTER

Earl M. Feary, Gen. Melt. Foreman, Symington-Gould Corp., Rochester, N. Y.
Arthur Henderson, Patternmaker, American Laundry Machinery Co., Rochester.
Leon C. Kimpal, Engr., Rochester Gas and Electric Corp., Rochester.
Walter A. Marsh, Patternmaker, Symington-Gould Corp., Rochester.
Elsworth J. Nickel, Foundry Foreman, Gleason Works, Rochester.
H. L. Oblein, Works Mgr., Symington-Gould Corp., Rochester.
William B. Richter, Foundry Foreman, Gleason Works, Rochester.
***Sargent & Greenleaf, Inc., Rochester (Mahlon F. Gentner).**
***Sargent & Greenleaf, Inc., Rochester (Milo O. Green).**
D. W. Talbott, Plant Supt., "C" Plant, Symington-Gould Corp., Rochester.
Raymond C. Thompson, Owner, Thompson Bros. Foundry, Rochester.
Haerle D. Wesgate, Core Room Foreman, Gleason Works, Rochester.
Frank W. Yury, Pattern Shop Foreman, Gleason Works, Rochester.

ST. LOUIS DISTRICT CHAPTER

O. A. Albertson, Independent Pneumatic Tool Co., St. Louis.
B. H. Johns, Independent Pneumatic Tool Co., St. Louis.
Donald MacArthur, Koppers United Co., Blast Furnace Div., Granite City, Ill.

SOUTHERN CALIFORNIA CHAPTER

***Hollywood Aluminum Products Co., Hollywood, Calif. (E. H. Wilson, Mgr.).**
Henry E. Russill, Vice Pres., Eld Metal Co., Ltd., Los Angeles.

TEXAS CHAPTER

W. H. Lyne III, Foreman, Dickson Gun Plant, Hughes Tool Co., Houston.
L. Mainor, Foreman, Cleaning Room, Hughes Tool Co., Houston.
***McKinley Iron Works, Ft. Worth, Texas (DeWitt McKinley, Mgr.).**
Geo. O. McVay, Foundry Foreman, Hartwell Iron Works, Houston.
W. H. Miner, Dist. Mgr., Lufkin Foundry & Machine Co., Lufkin, Texas.
***Royall Fire Brick & Supply Co., Houston (John H. Royall, Mgr.).**
Charles B. Saunders, Asst. Sales Mgr., Lone Star Steel Co., Dallas.
Walter J. Temple, Supt., Kincaid-Osburn Electric Steel Co., San Antonio, Texas.
Bartow L. Walker, Steel Melter, Hughes Tool Co., Houston.

TWIN CITY CHAPTER

Frank V. Guidinger, Sales Mgr., Republic Coal & Coke Co., Minneapolis.
Frank P. Ilenda, University of Minnesota, Minneapolis.
***Marrin Foundry, Inc., Minneapolis (Francis J. Marrin, Pres.).**

WESTERN MICHIGAN CHAPTER

***Fruitport Brass and Machine Co., Grand Rapids, Mich. (John H. Sharp, President).**

WESTERN NEW YORK CHAPTER

***Samuel Greenfield Co., Buffalo, N. Y. (Leonard Greenfield, Plant Mgr.).**
Charles P. Hague, Dist. Repr., Claude B. Schneible Co., Buffalo.
George B. Michie, Electro Refractories & Alloys Corp., Buffalo.
Thomas H. Powers, Works Engrg. Dept., Symington-Gould Corp., Depew, N. Y.

WISCONSIN CHAPTER

***Anderson Laboratories, Milwaukee (C. G. Anderson, President).**
Prof. George J. Barker, Mining & Metallurgy Dept., University of Wisconsin, Madison, Wis.
R. H. Gill, Maint. Engr., Allis-Chalmers Mfg. Co., West Allis, Wis.
Martin Hander, Lakeside Malleable Castings Co., Racine, Wis.
C. A. Krause, Secy., Anderson Laboratories, Milwaukee.
***United States Foundry Corp., Milwaukee (John M. Seip, Pres.).**
Frank W. Wells, A. O. Smith Corp., Milwaukee.
Harvey Eugene Zielke, University of Wisconsin, Madison, Wis.

OUTSIDE OF CHAPTER

Major A. E. Cambridge, Inspector-General's Repr., Inspection Board of U.K. & Canada, Ottawa, Ont.
***Canton Malleable Iron Co., Canton, Ohio (Fred J. O'Mara, Supt.).**
Walther L. Havekotte, Res. Engr., Battelle Memorial Institute, Columbus, Ohio.
G. L. Hawkins, Foreman, McCurdy Furnace & Foundry Co., Canton, Ohio.
***F. W. Hercus Mfg. Co., Ltd., Southwark, South Australia (Frederick Hercus).**
***La Consolidada, S.A., Mexico, D.F., Mexico (Edward W. Hill, Asst. to Vice Pres. and Gen. Mgr.).**
John L. Lee, Melbourne, Victoria, Australia.
***McCurdy Furnace & Foundry Co., Canton, Ohio (J. C. McCurdy, Mgr.).**
Nils E. Moore, Owner, Wadsworth Testing Laboratory, Wadsworth, Ohio.
***The F. E. Myers & Bro. Co., Ashland, Ohio (Edw. H. Taylor, Plant Engr.).**
***Pope Products Limited, Kilkenny, South Australia (William John Blanch, Chief Chemist).**
***Toowoomba Foundry Pty. Ltd., Toowoomba, Queensland, Australia (A. B. Lindley, Chief Designing Engr.).**
Chester B. Williams, Melting Foreman, Massillon Steel Casting Co., Massillon, Ohio.

C. E. Bales Heads Sub-Committee on Refractions

CECIL E. BALES, Vice Pres., Ironton Fire Brick Co., Ironton, Ohio, has been appointed chairman of the Subcommittee on Refractories, Cupola Research Project, Gray Iron Division of A.F.A. Mr. Bales succeeds the late J. F. Oesterle, Professor of Metallurgical Engineering, University of Wisconsin, Madison, Wis., whose death was announced in the February issue of "American Foundryman."

Mr. Bales has long been active on the Refractories Subcommittee of A.F.A., and has presented many papers on refractory subjects before Chapters and at annual meetings. He is well qualified to assume the chairmanship of this subcommittee. At present Mr. Bales is serving as president of the American Ceramic Society.

Book Review

Metallography of Aluminum Alloys, by L. F. Mondolfo. Blue cloth bound, 351 pages, 481 illustrations. Published by John Wylie and Sons, Inc., New York. Price, $4.50.

It is seldom that a book is encountered, written by a man whose experience includes a period of work in the foundry industry. Mr. Mondolfo has had such experience. This can be noted throughout the book in his references to micrographs of numerous sand-cast, die-cast and permanent mold alloys.

The book is interesting, the fore part dealing with equilibrium diagrams of the various aluminum alloys now in commercial use. In addition to the diagrams, he describes the effect of various additions to binary alloys, increasing them to ternary and quaternary alloys. The equilibrium diagrams themselves need not frighten the reader, as the text matter accompanying them points out the effect of the various elements added to aluminum.

Part 2 of the book deals with polishing and etching. Discussion of such subjects as micro-examination includes etching solutions and practices, polishing, and identification of constituents.

Part 3 of the book deals with commercial alloys, including the so-called master alloys or hardeners, aluminum-copper alloys, aluminum-silicon alloys, corrosion-resistant alloys, duralumin and aluminum-copper-nickel alloys.

Part 4 describes the effect of methods of fabrication on the microstructure, and deals with such subjects as melting, fluxing, pouring, casting, working, heat treatment and corrosion and protection.

The bibliography of 25 pages makes this book a worthwhile investment for the aluminum foundry metallurgist.

California Foundries Enter Sales Agreement

IN AN effort to promote harmonious dealings between customer and supplier, over honest differences of opinion that may arise, California foundries have entered into a standard sales and trade customs agreement.

Incorporated in the agreement, which has been approved by the National Association of Purchasing Agents, Inc., are the specifications pertaining to the standard painting of patterns, as set forth by the American Foundrymen's Association.

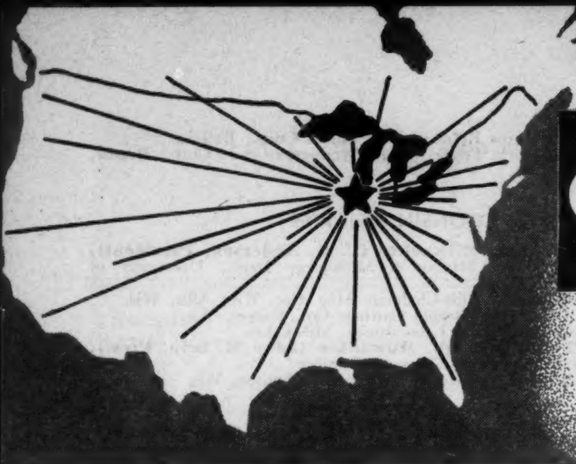
WANTED

Action Foundry Pictures

Members of A.F.A.:

American Foundryman is *your* magazine. You can help in publishing it by supplying National Headquarters at 222 West Adams St., Chicago, with good action pictures of foundry operations.

Help! Help!



CHAPTER ACTIVITIES News

See page 24 for list of Chapter representatives whose reports of local activities appear in this issue.

Joint No. California--ASM Meeting

By Geo. L. Kennard

THE JOINT meeting held January 14 by the A.F.A. Northern California Chapter and the Golden Gate Chapter of the American Society for Metals at the Engineers Club, San Francisco, attracted an attendance of 140.

Phillip McCaffery, General Metals Corp., Oakland, chairman of the Golden Gate group, called the meeting to order and, after a few announcements, turned the gavel over to Ralph C. Noah, San Francisco Stove Works, vice-president of the Northern California Chapter.

After expressing appreciation for the honor of conducting the joint session, Mr. Noah introduced several newcomers and then presented Robt. E. Donovan, Standard Oil Co. of California. Mr. Donovan's subject dealt with the importance of safe working practices for the conservation of life and man hours.

Harry G. Parcell, Geneva Steel Co., Geneva, Utah, substituted as the technical speaker for John R. Gregory, also of the Geneva Steel Co., who was scheduled to appear. Mr. Parcell gave a brief history of the Geneva plant, a subsidiary of the U. S. Steel Corp., explaining why it was built in the center of a desert country and pointing out advantages of the location. A motion picture, shown through the courtesy of the U. S. Steel Corp., dealt with various phases of steel production in relation to the war effort.

Tom E. Barlow Speaks To N.E.O. on Inoculation

By Edwin Bremer

TOM E. BARLOW, Vanadium Corp. of America, Detroit, gave a discussion on inoculation of gray cast irons at the January 13 meeting of the Northeastern Ohio Chapter, held at the Cleveland Club, Cleveland.

Chapter President James G. Goldie, Cleveland Trade School, presided at the dinner, and Vice-President R. F. Lincoln, Osborn Mfg. Co., Cleveland, introduced the speaker. Mr. Barlow stated that the use of small alloy additions in the ladle, to improve the quality of castings, appears to be growing in importance. The procedure, more recently termed inoculation, permits control of structure at all times. It was pointed out, however, that inoculation cannot be expected to overcome careless operation, and the speaker suggested that the aim should be to obtain the highest quality iron from a given composition or mixture.

Mr. Barlow said that often certain types of iron, particularly those of the high strength, low carbon class, tend toward a dendritic structure, a trend which will be eliminated by inoculation. In general, two types of inoculants are available: the graphitizing and the stabilizing groups.

The former contains such elements as silicon, titanium, calcium, etc., which act as graphitizers and deoxidizers. The stabilizing type contains such agents as chromium, silicon, manganese, etc. The graphitizing type inoculant usually is employed with the high strength, low carbon irons, and the stabilizing type with the soft grades of iron.

Since the effect of the inoculant wears off after a period of time ranging from 4½ to 35 min., according to Mr. Barlow, the most beneficial results are obtained by addtion just before pouring. The amount of inoculant to be added will depend on the base composition of the iron and the extent and type of improvement desired.

Officers of Texas Chapter, Secretary Harry L. Wren, Barada & Page (Left). Chairman F. M. Wittlinger, Texas Electric Steel Company (Center) and J. O. Klein, Texas Foundries, Inc., Vice-Chairman.

"Compressed Air" Is Topic at St. Louis

By J. H. Williamson

MEMBERS of the St. Louis District Chapter had an opportunity to discuss compressed air problems, January 13, when J. A. Murphy, Jas. A. Murphy Co.,

Hamilton, Ohio, addressed the regular monthly meeting at the DeSoto Hotel, St. Louis.

Chairman L. A. Kleber, General Steel Casting Corp., Granite City, Ill., presided, and announced that the Chapter had received invitations to attend meetings held by the American Society for Metals and the American Welding Society. The group voted to hold joint meetings with both of these organizations in the near future.

Attendance of 220 At Detroit Meeting

By A. H. Allen

THE LARGEST turnout of any regular meeting in the history of the Detroit chapter was on hand January 20, when 220 members and guests gathered at Rackham Memorial.

Ralph L. Lee, General Motors Corp., addressed the group for the second time. In speaking on "Leadership and What It Takes," he brought out both the good and bad characteristics of industrial leaders. His constructive criticism was intermingled with bits of witticism, so that his comments provoked alternate laughter and applause.

Core blowing was the technical subject of the evening, presented by M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., assisted by Zigmond Madacey of the same company. An unusually complete exhibit of blown cores, core boxes and related materials, together with lantern slides, contributed to the address.

Membership at 244 For Eastern Canada

By A. E. Cartwright

J. NIXON, Whitehead Metal Products Co., Inc., Buffalo, N. Y., attracted 102 members and guests to the Eastern Canada and Newfoundland Chapter's January 21 meeting, held in the Mount Royal Hotel, Montreal.

Mr. Nixon's presentation of "Molding Practice" consisted of a descriptive commentary on a series of full color slides of bronze castings, with satisfactory and unsatisfactory gating and feeding completely shown.

Announcement was made that membership in the group, founded in 1942, now stands at 244, only six short of the season's objective of 250.

At the directors' meeting, preceding the main meeting, it was unanimously approved that an apprentice competition be held this season in pattern making and molding in gray iron, bronze and steel. The contest will be under the supervision of the Apprentice Committee, headed by W. G. Burgess, Jenkins Bros., Ltd. Montreal.

Sitting at the head table at the January 28 Chesapeake Chapter meeting were: (upper photo, left to right) C. E. Adams, Bethlehem Steel Co.; J. E. Crown, Naval Gun Factory; H. E. Taylor, Naval Research Laboratory; R. J. Covington, American Hammered Piston Ring Div.; B. Bartel, University of Pennsylvania, Chairman of the Philadelphia Chapter. The photogenic personages in the lower picture are: H. M. Wittmyer, H. Wittmyer & Co.; Harold Hedberg, Koppers Co.; R. D. Ward, Navy Inspector; and Alex Wilkens, Gibson & Kirk Co.

Guy H. Rhodes Speaks To New England Group

By Merton Hosmer

SOME new thoughts on safe operating practices were presented to the 90 members and guests of the New England Foundrymen's Association at their February 9 meeting at the Engineer's Club, Boston. Guy H. Rhodes, Safety Supervisor, Foundry Div., Lynn & Everett Works, General Electric Co., in his subject "Educating for Safety in Foundries," emphasized the need for rigid safety control in foundries.

Explaining that the prime requisite of sound safety practices is the cooperation of all foremen, Mr. Rhodes pointed out the wisdom of making safety measures paramount in every manufacturing schedule. The importance of the safety supervisor was stressed, and his presence at many conferences of management was advocated, all toward the end of keeping accidents at a minimum.

Careful health checks of personnel, periodic safety inspections made throughout the plant, and the handicaps imposed by absenteeism were other points discussed in this timely address.

Twin City Considers The Industry's Future

By Alexis Caswell

CHAPTER Chairman C. H. Anderson, Crown Iron Works Co., Minneapolis, presided at the January 27 meeting, held by the Twin City group at the Leamington Hotel, Minneapolis.

Chairman Anderson acted as host to a second chapter leader, G. K. Dreher, Ampco Metal, Inc., Milwaukee, president of the Wisconsin group. Featured as the principal speaker, Mr. Dreher supplied food for thought in his discussion of the "Future of the Foundry Industry."

Among other constructive aspects, Mr. Dreher talked on the value of apprentices and technical men, the importance of research work in the foundry and, probably most important, the foundry "life insurance" that is largely dependent upon convincing engineers and designers of the benefits to be derived by specifying castings in their work, rather than plastics or other substitute materials.

Another forward step in this campaign to advance the foundry field, according to the speaker, is the stim-

ulation provoked by sponsoring contests and awarding prizes for papers dealing with the importance of castings in modern living. Co-operation with universities in research and development work was also stressed.

Pat Dwyer Speaks at Philadelphia Meeting

By Wm. S. Thomas

THE January 15 meeting of the Philadelphia Chapter was held at the Engineers Club, Philadelphia, and one of the largest crowds in the history of the chapter turned out to welcome and listen to Pat Dwyer, "The Foundry," Cleveland, talk on "Gates and Risers."

Pat gave an interesting and humorous talk on the subject, and illustrated several points with lantern slides. A lively discussion period followed.

As an after-dinner feature, two motion pictures were shown, one which is regularly used for training purposes by the Army Air Force; the other a basic study of electronics, showing the present development and future possibilities of electronics.

Ontario Features Furnace Operation

By G. L. White

FURNACE operation was the subject of discussion for gray iron, malleable and non-ferrous sections of the Ontario Chapter round table meeting in Hamilton November 26.

The gray iron group, with W. J. Brill, Canadian General Electric Co., Ltd., as chairman, was addressed by R. C. Vollick, Canadian Westinghouse Co., Ltd. Mr. Vollick outlined practice on furnaces in the Westinghouse foundry, dealing especially with a 32-in. front slagging furnace, used with continuous pour to supply mechanical units. A brisk discussion followed, covering the theoretical operation of cupolas, and ending in the final decision that every cupola has peculiar features which make it necessary to study it carefully and operate it accordingly.

The non-ferrous section was under the leadership of G. O. Loach, Otis-Fenson Elevator Co., Ltd.

A questionnaire prepared by M. E. McKinney, International Harvester Co. of Canada, Ltd., leader of the malleable group, was considered. The questions and answers arrived at follow:

1. For charging, should all the bungs be taken off or can the furnace be charged well enough from two openings in the roof?

Everyone present seemed to be charging with only part of the bungs removed.

2. What is the best arrangement in placing the different materials in the furnace—pig iron, annealed scrap, sprue and foundry returns, steel scrap?

The group was in accord on placing materials in the furnace in the following order: Sprue on the bottom, then annealed scrap, then pig iron with the steel scrap on top at about the middle of the furnace.

3. Is there a definite indicator of coal weight and air weight or volume being consumed per unit of time? What is the principle?

No furnaces are equipped with coal or air weight indicators. Coal feed is indicated by feed-screw revolutions; air is indicated by fan gate openings.

4. At the start of the heat, do you have a definite firing schedule for quantities of coal and air? Is this schedule followed religiously? Do you change this schedule from day to day, and on what indications are these changes based? Do you simply leave this up to the judgment of the furnace operator?

All present had a definite firing schedule at the start of the heat, and followed this religiously.

5. How about the importance of working or poking down the heat?

The consensus of opinion was that the sooner a heat was worked or poked down, the faster it would melt down.

6. Which is more advantageous, to start slagging as soon as possible or to wait until all is melted down?

Slagging as soon as possible was deemed more advisable, accelerating heating up.

7. During the remainder of the melting operation, how are the coal and air regulated? Are coal and air set at the same indicator figures for every heat; if not, on what indications are the figures based? Do you leave the coal and air settings up to the furnace operator's judgment?

During the heat, coal-air ratios are regulated by visual appreciation of the flame aspect, this being left to the operator's judgment.

8. Do you take a preliminary test for analysis? How is the time for taking this test determined? How long after this test is taken is the heat usually ready to tap?

All present took preliminary tests for analysis as soon as iron was reasonably hot. Heats are poured from one to one and a half hours after this test is taken.

9. What measure of fluidity or temperature is used to indicate

Part of the gathering at the January 28 meeting of the Chesapeake Chapter.

when the heat is hot enough to pour?

The unanimous test for pouring temperature was the time necessary for a test ladle of iron to "skin over." This time varied from 25 to 57 seconds.

10. While pouring, is some definite firing schedule or setting always used, or is this varied from one heat to another?

Some foundries use a definite firing schedule while pouring and some do not. The latter leave this to the operators judgment.

11. Is some iron left on the bottom of the furnace, and what is the effect of this on the following heat?

A little iron left in the furnace does no great harm; larger quantities increase melting time and oxidation.

12. What are the details of stopping off the tap holes between heats?

Quite some discussion ensued regarding the respective merits of stopping off with clay stoppers or with cores.

13. When all is finished, when is the operation of melting considered a success?

It was unanimously agreed that the ultimate aim was hot iron of the desired composition ready to pour at the right time, with secondary consideration as labor, fuel and refractory costs.

As a final discussion it was agreed that no one was sure of coal-air ratios because duplication of results was not always forthcoming. This was due to the fact that feed-screw speeds could not be indicative of the supply of usable calorific value in the form of coal, the latter depending on size, quality and dryness of coal, also on height of coal above screw. The chairman promised some means of more definite check on coal-air ratios in the near future.

Fred Sefing Speaks To Toledo Chapter

By R. B. Bunting

FRED G. SEFING, International Nickel Co., New York, was the speaker at the Toledo Chapter's January 25 meeting, held in the chapter clubrooms.

In discussing "A Study of Methods for Sound Castings," Mr. Sefing declared that he is convinced the success of any foundry, in fact, of the foundry industry as a whole, hinges upon its ability to consistently make sound castings. He strongly recommended the practice of keeping records of methods used in producing such castings and said photographs showing risers, gates and chills, together with dimensions, should be attached to blueprints wherever possible.

The importance of clean metal, controlled directional solidification, design and pouring of risers to feed castings, chills and adequate venting were also emphasized. The lively discussion period, following the address, was a definite indication of the success of the meeting.

(Photo courtesy Clyde Thomas, Whiting Corp.)

View of a recent Chicago Chapter round-table meeting.

Rochester is Host To 275 Foundrymen

By D. E. Webster

ROCHESTER, the youngest A. F.A. Chapter, entertained 275 foundrymen at the Hotel Seneca, Rochester, February 5, at the joint Rochester-Western New York Chapter meeting.

Mayor Samuel Dicker, of Rochester, and Vice-Mayor Frank E. Van Lare, accepted the Chapter's invitation to attend the meeting. Mayor Dicker spoke briefly, expressing his appreciation for the opportunity to greet this new A.F.A. Chapter, and extending his commendation to the entire foundry industry for its contribution to the war effort.

Frank Bates, Worthington Pump and Machinery Corp., Buffalo, Chairman of the Western New York Chapter, extended an invitation to attend the forthcoming A.F.A. 3rd War Production Congress, to be held in Buffalo, April 25-28.

W. J. Conley, Lincoln Electric Co., Cleveland, talked on "Foundry Variables and Their Effect on Casting Quality." Foundry variables, according to the speaker, can be grouped under four headings: Thermal, Chemical, Mechanical and Metallurgical. Closer attention to these features during recent months has contributed largely toward the elimination of many defects, furnishing better quality castings and increasing the yield of salable castings.

The method of introducing the metal into the mold, the design of gates and risers, chemistry of the metal, influence of the melting practice, composition of the charge, and ladle additions, all have an effect on the final product. They are features that should be carefully considered in the best of foundry practice. Mr. Conley illustrated his address with lantern slides.

Irving Rosenthal, Rochester Smelting & Refining Co., a Chapter Director, acting as Chairman of the Entertainment Committee, arranged the program which followed the business meeting.

"Home Talent" Featured at Chesapeake Meeting

By Geo. F. Kuhn

CHESAPEAKE CHAPTER deviated from its usual procedure of selecting out-of-town speakers by having one of its own members deliver a talk on "New Techniques in Gating and Risering" at the January 28 meeting, held at the Engineers Club, Baltimore.

Howard F. Taylor, Naval Research Laboratory, a chapter director, presented an interesting approach to an old subject.

His lantern slides and comments were directed at a comparably new means of risering, known as the "blind head method." He explored its possibilities in a manner that indicated he had spent considerable time on his experiments and had de-

veloped many practical applications. From the talk it was evident that the use of atmospheric pressure in the feeding of castings could be applied in a number of ways.

Patternmaking Is Subject At Central Ind. Meeting

By Robert Langsenkamp

E. T. KINDT, Kindt-Collins Co., Cleveland, talked to the 75 members and guests attending Central Indiana's February 7 meeting at the Athenæum, Indianapolis.

In his talk, Mr. Kindt emphasized the value of the patternmaker to a foundry, and pointed out the savings that can be effected through the use of proper technique and correct equipment.

Lantern slides contributed to the interest of the subject, which also included a discussion of the general trends in the pattern industry.

During the business meeting, chapter directors approved the purchase of a $500 war bond.

Reporters on Chapter Activities

Officers and representatives of A.F.A. chapter and other foundry groups who report on local activities in this issue, are identified below:

Central Indiana—Robt. Langsenkamp, Langsenkamp-Wheeler Brass Works, Inc., Indianapolis; Chapter Secretary.

Chesapeake—Geo. F. Kuhn, Gibson & Kirk Co., Baltimore, Md.; Chapter Reporter.

Detroit—A. H. Allen, Penton Publishing Co., Detroit; Chapter Secretary.

Eastern Canada & Newfoundland—A. E. Cartwright, Robert Mitchell Co., Ltd., St. Laurent, Que.; Chapter Director.

Michiana—V. S. Spears, American Foundry Equipment Co., Michigan City, Ind.; Chapter Director.

New England Foundrymen's Assn.—Merton A. Hosmer, Hunt-Spiller Mfg. Corp., Boston; Group Reporter.

Northeastern Ohio—Edwin Bremer, *The Foundry.*

Northern California—G. L. Kennard, Northern California Foundrymen's Institute, San Francisco; Chapter Secretary-Treasurer.

Ontario—G. L. White, Westman Publications, Ltd., Toronto; Chapter Secretary-Treasurer.

Philadelphia—Wm. S. Thomas, North Bros. Mfg. Co., Philadelphia; Chapter Director, Chairman Publicity Committee.

Rochester—D. E. Webster, American Laundry Machinery Co., Rochester; Chapter Secretary-Treasurer.

St. Louis—J. H. Williamson, M. A. Bell Co., St. Louis; Chapter Secretary-Treasurer.

Toledo—R. B. Bunting, Bunting Brass & Bronze Co., Toledo; Chapter Secretary-Treasurer.

Twin City—Alexis Caswell, Manufacturers' Assn. of Minneapolis, Inc., Minneapolis; Chapter Secretary-Treasurer.

Western Michigan—C. H. Cousineau, West Michigan Steel Foundry Co., Muskegon, Mich.; Chapter Secretary.

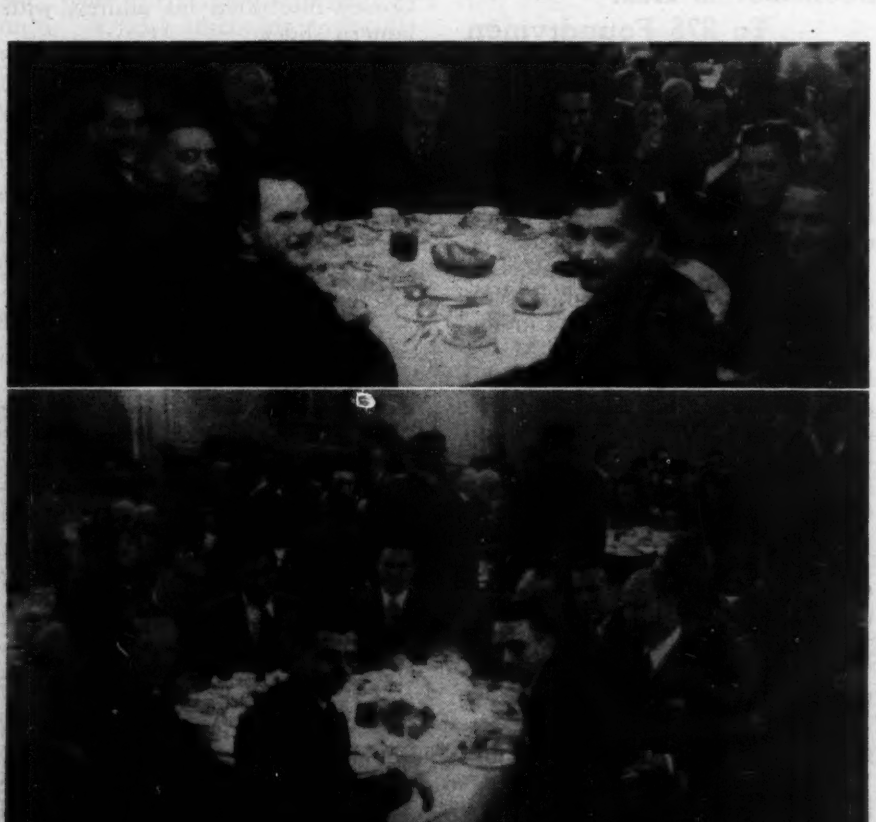
New Attendance Record For Western Michigan

By C. H. Cousineau

THE February meeting of the Western Michigan Chapter, held February 14 at Hotel Ferry, Grand Haven, Mich., brought out an attendance of 109 members and guests. This set a new high for a regular technical meeting.

J. J. Boland, Griffin Wheel Co., Chicago, was the speaker of the evening, his subject being "Relationship of Sand Control to Better Castings."

Mr. Boland reviewed the history of sand control development in the Griffin Wheel chain of foundries and cited significant reductions in scrap due to molding and sand in the period between 1935 and 1943. He said, "Give the sand the attention that sand deserves and the results in the cleaning room will be astounding."



Photographic record of Northeastern Ohio Chapter's Christmas Party.

Ned Briskin Is Speaker At Northern California

By Geo. L. Kennard

CHAPTER President Harry A. Bossi, H. C. Macaulay Foundry Co., Berkeley, Calif., presided at the Northern California Chapter's February 11 meeting, held at the Claremont Hotel, Berkeley.

The 123 members and guests present heard Ned M. Briskin, Permanente Metals Corp., Permanente, Calif., give the technical talk, which was illustrated with lantern slides, on "Magnesium Sand Castings."

Entertainment was provided by Clarence Colman, a comedian of radio fame, who provoked many a chuckle from the responsive audience.

At the business meeting for directors, held prior to the dinner, it was decided that the Northern California Chapter should partici-

(Photo courtesy Geo. T. Kuhn, Gibson & Kirk Co.)

Howard Taylor, Naval Research Laboratory, speaker at Chesapeake Chapter's January 28 meeting.

pate in the latest war loan drive through the purchase of two Series "G" war bonds.

Philadelphia Begins Round Table Meetings

By Wm. S. Thomas

THE February 11 meeting of the Philadelphia Chapter was held at the Engineers Club, Philadelphia.

Despite very bad weather, 125 members and guests were present to inaugurate the first round-table discussion to be held by the Chapter.

Following the dinner and general meeting, the membership divided into three separate groups—gray iron, non-ferrous and steel. Each group was assigned an individual meeting room.

Discussion leaders were B. A. Miller, Cramp Brass and Iron Foundry, Drexel Hill, Pa., gray iron; William Grimm, Crown Smelting Co., non-ferrous; and H. D. Phillips, Lebanon Steel Foundry, Lebanon, Pa., steel.

E. W. Horlebein, Gibson & Kirk Co., Baltimore, Md., acted as technical chairman to the entire assembly. Mr. Horlebein, with a wide experience in round-table discussions, contributed much to the meeting.

It was the general consensus of opinion that this meeting was one of the most successful that the Philadelphia Chapter has held to date. In fact, it was voted to continue the same sessions where they left off, in the early future.

Photos Prove Success Of N.E.O. Annual Party

A December report told of the success of the Northeastern Ohio Christmas Party. Photos just received at National Headquarters attest to the reliability of the news release, as indicated in the reproductions in this section.

Michiana Discusses Job Evaluation

By V. S. Spears

THE JANUARY 4 meeting of the Michiana Chapter, held at the LaSalle Hotel, South Bend, was devoted to the discussion of one phase of costs applicable to industry as a whole—labor cost. This discussion was given by J. Wittner, Oliver Farm Equipment Co., South Bend, under the title of "Job Evaluation."

Mr. Wittner defined job evaluation as a device of pool judgment, set up on a comparable basis, scientificially establishing all known values and variables, and providing for mutual participation of management and employee. This mutual participation, the speaker said, leads to satisfactory labor relations which, in turn, mean sound wage policy.

Charts, showing how to evaluate individual jobs, were then presented. These charts, set up on the basis of the men, material and conditions to complete a job, were further elaborated by giving examples of job factors and weights which must first be established. Another chart showed the method of converting the point values to labor rates and the establishment of a base line rate, from the lowest paid job to the highest.

The 70 members in attendance expressed the opinion that subjects of this type should be included as a regular feature in chapter meeting programs, because of labor shortage and continuous requests for adjustment of rates.

More evidence that the Northeastern Ohio Christmas Party was a huge success.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.

When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Aircraft Castings

ALUMINUM. *(See Aluminum-Base Alloys.)*

Aluminum

AIRCRAFT CASTINGS. *"Castings in Aircraft Construction,"* Daniel M. Davis, THE IRON AGE, vol. 152, no. 19, November 4, 1943, pp. 52-56, 154.

Wartime demands upon forging and extrusion facilities made it necessary to substitute castings for forged and extruded aircraft parts, regardless of any weight penalties which were thought necessary. When this substitution became unavoidable, careful designing of castings and selection of casting alloys resulted in the production of parts which, in many cases, imposed no weight penalties. Furthermore, they frequently resulted in production time and cost savings.

The alloy selected by the Vultee Field Division of the Consolidated Vultee Aircraft Corp. for the majority of aircraft castings because of its casting versatility, was 356-T6. When higher strength requirements were necessary, the next choice was B195-T6. When these two aluminum-base alloys would not permit the use of a part of the required strength and small size, malleable iron was used. The use of X-ray inspection in correcting design and foundry techniques greatly aided the production of castings which are able to meet aircraft part requirements.

MELTING FURNACES. *(See Furnaces.)*

SECONDARY METALS. *(See Secondary Metals.)*

Aluminum-Base Alloys

COMPOSITION AND PROPERTIES. *"Light Metal Casting Alloys,"* METALS AND ALLOYS, vol. 18, no. 6, December, 1943, pp. 1347, 1349.

A tabulation of the composition, properties, and uses of aluminum-base and magnesium-base casting alloys.

Analysis

CHEMICAL. *"Microchemical Analysis Application to Iron and Steel,"* E. C. Pigott, IRON AND STEEL *(British)*, vol. 17, no. 1, October, 1943, pp. 2-8 and vol. 17, no. 3, November, 1943, pp. 140-144.

Microchemical analysis is the analysis of samples too minute to respond to ordinary manipulation. This paper presents the translations of three papers on microchemical analysis.

"Metallurgical Applications of Microchemistry" (Sur les applications de la microchimie aux etudes metallurgiques,") Benedicks and Treje, REV. MET., 33, 1936, pp. 203-208; covers many qualitative methods and also processes for analyzing isolated inclusions.

"Some Applications of Micro-Analysis to the Investigation of Metals and Alloys," Leroy, REVUE DE METALLURGIE, 35, 1938, pp. 104-115; quantitative micro-procedures for estimating manganese, phosphorus, and chromium.

"The Micro-Analytical Investigation of Metals," N. Niessner, ANG. CHEMIE, 52, December, 1939, 721-726; discusses spot analysis, concentration technique and the application of imprinting methods in the examination of distribution.

Following the translations, the author discusses the application of microchemical analysis to the investigation of heterogeneity of castings and the colorimetric methods applicable to the determination of various elements.

Brass

SECONDARY METALS. *(See Secondary Metals.)*

Brass and Bronze

USE OF CHILLS. *"Chills Used on Bronze Castings,"* J. W. Bryant, THE FOUNDRY, vol. 71, no. 12, December, 1943, pp. 109, 168-169.

The use of cast iron chills to eliminate shrinkage by promoting directional solidification is applicable to bronze castings. Either permanent molds or combination sand and chill molds may be used.

Bronze

DENSITY. *"Density of Chill and Sand-Cast Bronzes,"* V. Kondic, THE METAL INDUSTRY, vol. 63, no. 17, October 22, 1943, pp. 261-263.

Experiments performed to determine the cause of the difference in density between chill-cast and sand-cast tin bronze have led to the possible explanation that the slower solidification of sand castings permits more dissolved gases to escape from the metal, thereby lowering the density.

This theory also explains the fact that cubes of metal taken from the outside of a chill-cast ingot are slightly more dense than cubes of metal taken from the inside of the same ingot. The greater chill effect at the outside would prevent as much dissolved gas from escaping.

If this explanation is correct, then the effect of gas in a melt would be much greater on chill-cast than on sand-cast metal. The chill-cast metal would retain far more of the gas than would the sand-cast metal.

SECONDARY METALS. *(See Secondary Metals.)*

Cast Iron

CORROSION RESISTANT. *"High Silicon Acid-Resistant Cast Iron,"* J. E. Hurst, IRON AND STEEL (British), vol. 17, no. 4, December, 1943, p. 181-185.

The author discusses the corrosion resistance of irons containing over 14 per cent silicon to various acids.

He also describes the physical and mechanical properties, the importance of carbon content, gas content, and casting temperature, annealing, and welding of high silicon irons.

GRENADES. *"Hand Grenades Made of Gray Cast Iron,"* Edwin Bremer, THE FOUNDRY, vol. 71 no. 12, December, 1943, pp. 104-105, 184-185.

The author describes the methods for molding and finishing hand grenade castings.

HIGH-DUTY CAST IRON. *"High-Duty Cast Irons for General Engineering Purposes,"* Third Report of Research Committee of the Institution of Mechanical Engineers, Prepared by J. G. Pearce, FOUNDRY TRADE JOURNAL, vol. 71, no. 1419, October 28, 1943, pp. 159-162.

This report presents the results of tests on commercial materials and experimental work on alloyed cast irons.

MELTING. *(See Cupola Practice.)*

MICROCHEMICAL ANALYSIS. *(See Analysis.)*

Centrifugal Casting

CASTING OF TUBULAR PIECES. *"Centrifugal Castings,"* G. F. Alexander, FOUNDRY TRADE JOURNAL, vol. 71, no. 1416, October 7, 1943, pp. 109-110.

This paper, which was presented be-

fore the South African Branch of the Institute of British Foundrymen, briefly describes the centrifugal casting process, and how it was adapted to the production of tubular pieces for the manufacture of piston rings and cylinder liners.

LOST WAX PROCESS. *(See Precision Casting.)*

STEEL. *"Developments in America in the Centrifugal Casting of Steel,"* J. E. Hurst, IRON AND STEEL (British), vol. 17, no. 1, October, 1943, pp. 9-12.

Based on a survey of centrifugal casting in the United States, the author has discussed the types of centrifugal castings, casting methods, and methods and equipment in use in various production foundries in this country.

STEEL. *"Hydraulic Drive Spins Steel Castings Machines,"* Edwin Bremer, THE FOUNDRY, vol. 71, no. 11, November, 1943, pp. 154, 157.

Most centrifugal casting machines are driven by electric motors through v-belt drives. However, the Youngstown Alloy Castings Corp. of Youngstown, Ohio, successfully adapted a hydraulic drive to their centrifulgal casting machines. The author describes the hydraulic drive equipment.

Chemical Analysis

COLORIMETRIC. *"The Use of Photo-electric Spectrophotometric Techniques in Chemical Analysis,"* J. W. Stillman, A.S.T.M. BULLETIN, no. 125, December, 1943, pp. 17-19.

A brief survey of the use of spectrophotometry in chemical analysis.

Chills

NON-FERROUS CASTINGS. *(See Brass and Bronze.)*

Cleaning

SNAGGING. *"Snagging Castings,"* G. S. Eisaman, THE FOUNDRY, vol. 71, no. 11, November, 1943, pp. 119-120, 173-176.

Snagging, a material removing operation in which the finish requirements are usually negligible, is performed with one of three types of grinders—swing frame, floor or bench type, or portable.

In the floor or bench type, the work is brought to the wheel. In the other two types, the wheel is brought to the work. In all cases the operator controls the pressure between the work and the wheel.

Economical grinding results from a proper balance of pressure. A wheel should be operated only at its correct speed. Insofar as possible, the wheel used should be the type best suited to the job.

Hard, low tensile-strength metals are best ground with silicon carbide wheels. Other metals are best ground with aluminum oxide wheels. In general, coarser abrasives remove material faster. The operator's skill can do much to determine the life of a wheel. In figuring grinding economy, labor cost should be considered as well as wheel cost. Often a faster wearing wheel will be the most economical, for it may enable the operator to finish the job in much less time.

Copper

SECONDARY METALS. *(See Secondary Metals.)*

Copper-Base Alloys

WARTIME FOUNDRY PRACTICE. *"Copper Alloy Castings,"* H. J. Miller, CANADIAN METALS AND METALLURGICAL INDUSTRIES, vol. 6, no. 12, December, 1943, pp. 33-36, 46.

Wartime castings applications and metals restrictions in Britain have resulted in a greatly increased output of cast copper-base alloys.

The author discusses the alloys now in use in Britain for various types of castings and the problems encountered in obtaining metals.

Core Blowing

ALUMINUM AIR-COOLED CYLINDER HEADS. *(See Cylinder Heads.)*

Cores

MAGNESIUM CASTINGS. *(See Magnesium.)*

Corrosion Resistant Alloys

HIGH SILICON ALLOYS. *(See Cast Iron.)*

Costs

GRAY CAST IRON. *"Sound Casting—The Essential Foundation for Gray Iron Prosperity,"* John L. Carter, THE FOUNDRY, vol. 71, no. 12, December, 1943, pp. 103, 179-183.

The author evaluates the cost systems in use in gray iron foundries at the present time and discusses the reasons for accurate cost systems in foundries.

Creep Properties

CAST CARBON-MOLYBDENUM STEEL. *(See Steel.)*

Cylinder Heads

CORE PRODUCTION. *"Women Make Air-Cooled Cylinder Heads,"* Frank G. Steinbach, THE FOUNDRY, vol. 71, no. 12, December, 1943, pp. 98-102, 199.-201.

Using a combination of vibrating machines, jolt machines, core blowers, and rollover machines, the Caterpillar Tractor Co. of Peoria, Ill., is now producing aluminum air-cooled cylinder heads with a foundry personnel comprised of 85 per cent women.

Cupola Practice

ECONOMY. *"Savings to Be Effected in Cupola Melting,"* John Lowe, THE FOUNDRY, vol. 71, no. 11, November, 1943, pp. 158, 160.

The author reviews the factors in cupola operation which must be controlled to effect melting economy.

Desulphurizing

CONVERTER STEEL. *"Desulphurizing in Converter Steel Practice,"* George S. Evans, CANADA'S FOUNDRY JOURNAL, vol. 16, no. 12, December, 1943, pp. 5-6.

A description of desulphurizers and efficient ladle desulphurizing practice.

Die Casting

ZINC-BASE ALLOYS. *"Zinc Die-Casting Alloys, Mechanical Properties at Subnormal Temperatures,"* S. W. K. Morgan and B. D. Darrah, THE METAL INDUSTRY, vol. 62, no. 23, December 3, 1943, pp. 354-356.

A comparison of the tensile strength, elongation, and impact strength of zinc-base die casting alloys with aluminum-base die casting alloys at subnormal temperatures, and a discussion of the theoretical aspects of impact strength at subnormal temperatures.

Furnaces

ALUMINUM MELTING. *"Induction Furnace for Electric Melting of Aluminum,"* Manuel Tama, METAL PROGRESS, vol. 44, no. 5, November, 1943, pp. 967-968B.

Construction, operating principles, and power requirements of induction furnaces are considered for melting aluminum alloys.

LININGS. *(See Refractories.)*

TEMPERATURE CONTROL. *(See Pyrometry.)*

High-Temperature Properties

CAST CARBON-MOLYBDENUM STEEL. *(See Steel.)*

Impact Strength

ZINC-BASE ALLOYS. *(See Die Casting.)*

Impregnation

DRYING. *(See Infra-Red Ray Drying.)*

MAGNESIUM CASTINGS. *(See Magnesium.)*

Infra-Red Ray Drying

IMPREGNATED CASTINGS. *"Drying Impregnated Castings with Infra-Red Rays,"* S. H. Brams, THE IRON AGE, vol. 152, no. 24, December 9, 1943, p. 64.

Infra-red rays are now used for drying impregnated castings in the Ford aluminum and magnesium foundries.

Castings are allowed to air-dry for one hour, and are then moved on a chain conveyor through an infra-red lamp tunnel. Castings pass through the tunnel at a sufficiently slow speed to permit complete setting of the impregnating agent.

Lead

SECONDARY METALS. *(See Secondary Metals.)*

Lost Wax Process

ADAPTATIONS. *(See Precision Casting.)*

Magnesium-Base Alloys

COMPOSITION AND PROPERTIES. *(See Aluminum-Base Alloys.)*

Malleable Iron

AIRCRAFT CASTINGS. *(See Aluminum.)*

Machining

STEEL. *"Machining Cast Armor Plate,"* Fred W. Lucht, ARMY ORDNANCE, vol. 25, no. 141, November-December, pp. 559-563.

Among the general difficulties encountered in machining armor-plate castings are an extremely hard, glassy surface; frequency of irregular contours which necessitate interrupted cutting; occurrence of scale, hidden sand pockets, and extremely hard inclusions; and a tendency of the metal to work-harden during machining.

All equipment used in machining should be sufficiently rugged to withstand the loads applied and the shock resulting from the interrupted cutting. Variable speed control is essential. Preparation of a "planned-cutting" layout may effect considerable saving in time by indicating the most desirable sequence or combinations of cuts.

In general, carbide tools should be used in preference to high-speed steel tools. Tool shapes should be correct in every respect. The tool should be designed to avoid digging in on interrupted cuts and to absorb backlash before the nose of the tool enters a cut. Tools should be of sufficient cross section to withstand the bending load resulting from depth of cut and feed. Tool overhang should be kept at a minimum. It is most important that tools be prevented from becoming excessively dull. Careful grinding of tools can greatly speed up machining time.

Actual cutting speeds depend upon the machine and work conditions. Deep cuts are preferable to light cuts, even when a light feed must be used to compensate for the increased depth. This is even more true on interrupted cuts.

As a rule, armor-plate castings should be machined dry. However, when dimensional accuracy is of prime importance, a coolant may be used to absorb heat and prevent distortion. Chip breakers should be used only when the chip becomes a hazard to the operator, spoils the finish, or has a tendency to spoil the tool. If chip curlers are used, they should be correctly reground when tools are sharpened.

Magnesium

CORES. *"Cores for Magnesium Castings,"* N. M. Briskin and George Walker, THE METAL INDUSTRY, vol. 63, no. 12, September 17, 1943, pp. 183-185; vol. 63, no. 13, September 24, 1943, pp. 203-204.

Cores for magnesium castings have many of the core requirements for castings made from other alloys. However, they also have special requirements resulting from properties and characteristics peculiar to magnesium-base alloys.

The high shrinkage of magnesium-base alloys, coupled with hot shortness, necessitates low strength at high temperatures to prevent cracking the castings. At the same time, because many chills are used in casting magnesium alloys, the core sand must have sufficient green strength to support the weight of these chills.

A low heat content requires that the cores disintegrate at a low temperature to permit core removal. Therefore, special provisions must be made to permit core knockout.

Sintering is not a problem of magnesium cores. The light metal weight means that dry strength need not be so great. However, any excess gas in the cores will readily form blow holes.

The extreme affinity of magnesium for oxygen means that inhibitors must be used for all cores. Boric acid or sulphur may be incorporated in the core mix, while fluoride sprays may be applied to the outside of the cores. These form large volumes of gases which must escape, and therefore the sand must be quite permeable.

Cores for aircraft castings should have a hard surface and a soft interior to insure dimehsional accuracy. Core sand should be round grained.

The ideal core binder for magnesium castings would migrate to the outside of the core during baking, leaving a hard surface. Some resin binders do this, but it has been found more satisfactory simply to spray the outside of the core with core oil. The authors list seven recommended core mixes and tabulate the proportions and properties of these mixes. Cores for magnesium castings generally require high dimensional accuracy and smooth finish.

IMPREGNATION. *"Magnesium Castings Impregnated by New Method,"* S. H. Brams, THE IRON AGE, vol. 152, no. 20, November 11, 1943, pp. 57-59.

A direct pressure method of forcing tung oil into cavities in magnesium castings has proven more satisfactory than the older vacuum method. In the new method, castings are heated to 350° F. and then placed in fixtures which feed tung oil to the casting cavities.

Air is removed from the cavity by allowing tung oil to flow through the cavities. Then the flow valves are closed and the oil is brought to a dead end under 90 lb. pressure. The casting is thus held for 10 min. After holding, the castings are degreased and then allowed to stand for 8 to 12 hr. to permit the tung oil to oxidize. Following this, the pieces are placed in an oven, brought to 350° F. during 2 hr. time, and held at that temperature for 4 hr. Then the outside of the casting is cleaned with sandblasting, if necessary, and then treated with dichromate solution.

Precision Casting

METHODS. *"Precision Casting,"* STEEL, vol. 114, no. 2, Jan. 10, 1944, pp. 78-80, 82, 96.

Precision casting is an adaptation of the lost wax process to centrifugal, pressure, or vaccum casting.

Precision casting procedure described in the article includes making a wax or plastic pattern; encasing the pattern in a refractory shell or mold; removing the pattern by means of melting or vaporizing; and filling the mold cavity by means of centrifugal, pressure, or vacuum methods of casting.

Pyrometry

TEMPERATURE CONTROL. *"Anticipating Thermocouple for Close Temperature Control,"* R. L. Longini, PRODUCT ENGINEERING, vol. 15, no. 1, January 1944, p. 49.

Hunting and initial over-shooting in thermocouple-controlled furnaces can be reduced to a minimum by placing in series with the standard couple an anticipating thermocouple which generates an e.m.f. proportional to the rate of change of temperature.

The anticipating thermocouple consists of two ordinary couples connected back to back, so that both leads are of the same material.

The standard couple is placed in the "work" and the anticipating couple is placed in the combustion chamber.

Reclamation

IMPREGNATION. *(See Magnesium.)*

Refractories

BASIC OPEN-HEARTH. *"The Maintenance of the Furnace Linings in Large Basic Open-Hearth Tilting Furnaces by the Use of Chrome Ore, Magnesite and Serpentine,"* A. Jackson, THE REFRACTORIES JOURNAL, no. 9, September, 1943, pp. 303-304.

At the autumn meeting of the Iron and Steel Institute, the author discussed the use of parging pastes containing chrome ore and serpentine for the purpose of reducing magnesite consumption. The results obtained with various mixtures are described.

Scrap

SEGREGATION. *(See Secondary Metals.)*

RECLAMATION. *(See Secondary Metals.)*

Secondary Metals

WAR PROBLEMS AND METALLURGY. *"Secondary Metals Symposium,"* METALS TECHNOLOGY, vol. 10, no. 7, October, 1943.

This Symposium was held under the auspices of the Institute of Metals Division during the annual meeting of the American Institute of Mining and Metallurgical Engineers at New York, February 15-18, 1943. The Symposium is divided into three sessions.

The First Session, General Survey of the Secondary Metal Problem, is comprised of the following papers: "Introduction," by F. W. Willard; "Wartime Changes in the Secondary Metals Industry," by Frederic H. Wright; "Problems of the Producer in Segregation and Reclamation," by Floyd E. Bliven; "Mechanics of Secondary Metals Collection," by Ray Schmidt; "Problems of the Consumer of Scrap in Segregation and Reclamation," by L. S. Dietz, Jr.; and a discussion of the foregoing papers.

The Second Session, Metallurgy of Secondary Metals, is comprised of the following papers: "Introduction," by James S. Earle; "Specifications and Conservation," by Carter S. Cole; "Available Brass and Bronze Ingots for Implements of War," by William Romanoff; "Recovery of Copper from Clad Steel Scrap," by G. L. Craig; and a discussion of the foregoing papers.

The Third Session, a continuation of Metallurgy of Secondary Metals, was comprised of the following papers: "Metallurgy of Secondary Tin and Lead," by Gustave E. Behr; "Scrap Metals from Ordnance," by Lowell S. Thomas; "Secondary Aluminum in War Production," by J. J. Bowman; and "Secondary Magnesium," by Charles E. Nelson.

Specifications

CASTINGS. *"Casting to Specifications,"* Canadian METALS AND METALLURGICAL INDUSTRIES, vol. 6, no. 10, October, 1943, pp. 38, 40.

Castings specifications are based upon the experience with the specified alloy

or part of the person or persons formulating the specifications.

Casting defects should be repaired only after consideration of service conditions and with proper authorization. If a high percentage of castings is defective, casting design and foundry technique should be checked.

Steel

CENTRIFUGAL CASTING. *(See Centrifugal Casting.)*

CREEP CHARACTERISTICS. *"Structure and Creep Characteristics of Cast Carbon-Molybdenum Steel at 950° F.,"* H. E. Montgomery and John Urban, A.S.T.M. BULLETIN, no. 125, December, 1943, pp. 13-16.

A presentation of results of creep tests performed at 950° F. on cast carbon-molybdenum steel having different structures.

The tests indicate that a coarse-grain acicular structure has the best creep-resisting properties and a fine-grain pearlitic structure has the poorest creep-resisting properties.

DESULPHURIZING CONVERTER STEEL. *(See Desulphurizing.)*

MACHINING. *(See Machining.)*

MICROCHEMICAL ANALYSIS. *(See Analysis.)*

Subnormal Temperature Properties

ZINC-BASE ALLOYS. *(See Die Casting.)*

Temperature Control

THERMOCOUPLES. *(See Pyrometry.)*

Tin

SECONDARY METALS. *(See Secondary Metals.)*

Zinc

SECONDARY METALS. *(See Secondary Metals.)*

Zinc-Base Alloys

SUBNORMAL TEMPERATURE PROPERTIES. *(See Die Casting.)*

Schedule of March Chapter Meetings

March 6

Central Indiana
Athenaeum, Indianapolis
R. F. LINCOLN
Machine Div., Osborn Mfg. Co.
"Core-Blowing Methods and Equipment"

✦

Chicago
Chicago Bar Assn. Restaurant
ROUND TABLE MEETING
Steel—*"Gating, Risering and Pattern Rigging"*
Gray Iron—*"Controlled Solidification Gating and Heading"*
Non-Ferrous—*"Pressure Castings in the Brass Foundry"*

✦

Metropolitan
Essex House, Newark, N. J.
DEAN LEACH
Sperry Gyroscope Co., Inc.
"Control in Production of Magnesium Castings"

✦ ✦

March 3

Western New York
Touraine Hotel, Buffalo
EMIL A. PIPER
Pohlman Foundry Co., Inc.
"Casting Design"

✦ ✦

March 7

Michiana
Hotel LaSalle, South Bend
Engineers from American Foundry Equipment Co.
"Clean War Material"

✦ ✦

March 8

Rochester
Geology Bldg., University of Rochester
CHAS VAUGHN
Ritter Co.
"Non-Ferrous Foundry Practice"

✦

March 9

Northeastern Ohio
Cleveland Club, Cleveland
DE WITT HOFFMAN
Div. Safety and Hygiene, Ind. Commission of Ohio
"Silicosis in Foundries"

St. Louis
DeSoto Hotel, St. Louis
M. J. GREGORY
Caterpillar Tractor Co.
"Core Blowing"

✦ ✦

March 10

Central New York
Onondago Hotel, Syracuse, N. Y.
W. H. ROMANOFF
Kramer & Co.
"Foundry Practice of Alloys Used in Implements of War"

✦

Northern California
DALE TROUT
General Electric Co.
"Industrial Fluoroscopy"

✦

Philadelphia
Engineers Club, Philadelphia
HOWARD F. TAYLOR
Naval Research Laboratories
"Future of Steel Castings"

✦

Southern California
Elks Club, Los Angeles
W. B. ILKO
Abrasive Co.

✦

Wisconsin
Schroeder Hotel, Milwaukee
DR. JAS. S. THOMAS
"New Frontiers for Smart Foundrymen"

✦ ✦

March 13

Cincinnati
Cincinnati Club, Cincinnati

✦

Western Michigan
Hotel Ferry, Grand Haven

✦ ✦

March 14

Northern Illinois and Southern Wisconsin
Hotel Hilton, Beloit, Wis.
FRED G. SEFING
International Nickel Co.
"A Study of Molding Methods for Sound Castings

March 16

Detroit
Rackham Memorial, Detroit
ROUND TABLE MEETINGS
Steel—F. A. MELMOTH, *"Metallurgical Practice"*
Brass & Bronze—Speaker to be announced
Gray Iron—R. G. MCELWEE, *"Inoculated Irons"*
Malleable—Speaker to be announced

✦ ✦

March 17

Eastern Canada and Newfoundland
Mt. Royal Hotel, Montreal
MOTION PICTURES

✦ ✦

March 20

Quad City
Hotel Ft. Armstrong, Rock Island, Ill.
C. O. THIEME
Kramer & Co.
"Non-Ferrous Metals"

✦ ✦

March 24

Chesapeake
Engineers Club, Baltimore, Md.
W. B. GEORGE
R. Lavin & Sons, Inc.
"Bronze Castings"

✦ ✦

March 28

Toledo
PAT DWYER
"The Foundry"
EQUIPMENT NIGHT

✦ ✦

March 30

Twin City
Leamington Hotel, Minneapolis
ROBT. W. BINGHAM
American Hoist & Derrick Co.
"Safety in the Foundry"

✦ ✦

March 31

Ontario
Royal Connaught Hotel, Hamilton
ROUND TABLE MEETING
Malleable, Gray Iron, Non-Ferrous